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ORIGINAL COMMUNICATIONS.

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THE TREATMENT OF FRONTAL SINUS SUPPURATION.*

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The treatment of any lesion should aim to overcome the cause and results of its existence. Frontal sinus suppuration is caused, primarily, by infection, but its obstinacy and continuance are due also to certain pathologic changes occurring in the wall of the sinus.

Attacks of acute inflammation may subside without after-effects but, if repeated, certain morphologic changes result which are followed by prolonged suppuration. These changes affect the drainage of the sinus and the integrity of its lining; hence, any operative measures should aim to supply ample drainage and restore, so far as possible, the integrity of the lining of the sinus. The amount of exudate is a variable factor influenced by the virulence of the infection, the obstruction at the ostium frontale, and the changes in the mucosa. The latter may be comparatively smooth, or there may be great thickening from excess of connective tissue formation or abundant polypoid masses. The chief factor in the prolongation of sinus suppuration is inadequate drainage occurring in a more or less partially closed, mucous membrane lined, bony cavity. Such conditions could never take place on a flat mucous surface.

Hence, the logical, conservative treatment of this condition demands the establishment of adequate drainage and, in certain cases,

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local treatment of the sinus lining. On the other hand, the symptoms may sometimes be overcome by destructive measures; i. e., the obliteration of the sinus.

Symptoms: It is not my purpose to consider the signs and symptoms but, suffice it to say, that the pain and tenderness indicate roughly the degree of tension of the exudate, the amount of which depends upon several factors, such as the size of the sinus, the virulence of the infection, and the secondary sinus wall changes.

Healing of suppurating cavities: When we consider the subject of suppuration in different parts of the body, certain facts are indisputable. Abscess cavities in soft tissues heal only when such cavities are obliterated, as a result of the processes of repair, e. g.,

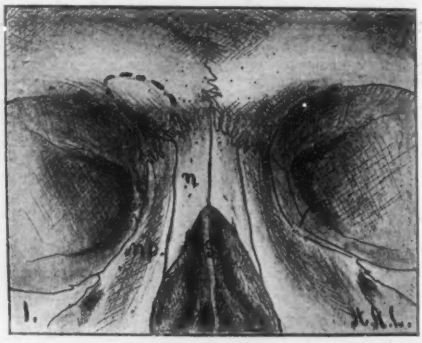

Figure 1. Anterior view frontal region; projected outline of opening into sinus through which all extranasal operating is performed on both sinuses: n, nasal bone; np, nasal process; s, septum; l, lachrymal bone.

furuncle, cellulitis, residual abscesses in the peritoneal cavity, etc. Thoracic empyema will persist either until the lung again fills the cavity or until the chest wall is made to approach the lung by some extensive plastic operation, as is sometimes necessary in very chronic cases. Healing ensues in these two instances only as the suppurating cavity is gradually obliterated.

In the case of the frontal sinus we have to deal with a natural bony cavity lined with epithelium. Suppuration in such a cavity will cease if it is obliterated or if all causes of suppuration are overcome; hence, in frontal sinus suppuration treatment may be directed towards obliteration of the cavity, or restoration of drainage, or a combination of both.

History: Let us consider first some of the various methods of treating these cases. We may operate intra-nasally, extra-

nasally, or we may combine these two methods of approach. Many cases recover under any of these methods, but there is a considerable percentage which it has been difficult to cure; hence, the occasion of the more radical methods that have been devised. The ideal method should combine efficiency, safety, absence of deformity, and preservation of the sinus.

1. *Intra-nasal methods*: Many sinuses can be probed and then irrigated, but irrigation is of little practical value and such cases

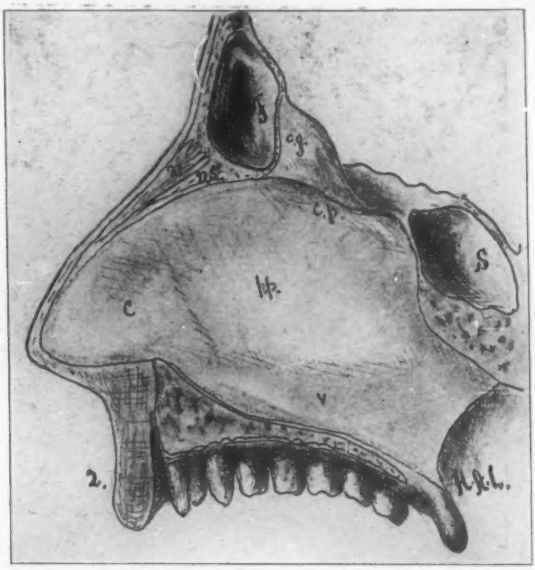

Figure 2. Nasal septum, also the dense bone below frontal sinus (F) in the median line; n, nasal bone; ns, nasal spine of frontal bone; cg, crista galli.; cp, cribriform plate; S, Sphenoidal sinus; pp, perpendicular plate; c, triangular cartilage; v, vomer.

would probably resolve spontaneously. On the other hand, one cannot be absolutely certain that the probe enters the sinus and not the anterior ethmoid cell, as represented by a so-called frontal bulla.

The sinus opens into the middle meatus through the ethmoid cells, in one way or another, and the passage may be narrow on account of these cells or because of the position of the anterior end of the middle turbinate. As a preliminary step in all cases, the front portion of this turbinate should be generously removed

and the neighboring, thin-walled ethmoid cells broken down. This may suffice for cure and, therefore, nothing further be required. It will fail if obstruction to drainage persists or if the sinus is filled with granulations or polyps.

There are operations devised for breaking through the nasal floor of the sinus from below by means of burr drills and rasps, often combined with shields to protect the posterior sinus wall. Undoubtedly, much of the sinus floor may be removed by this method

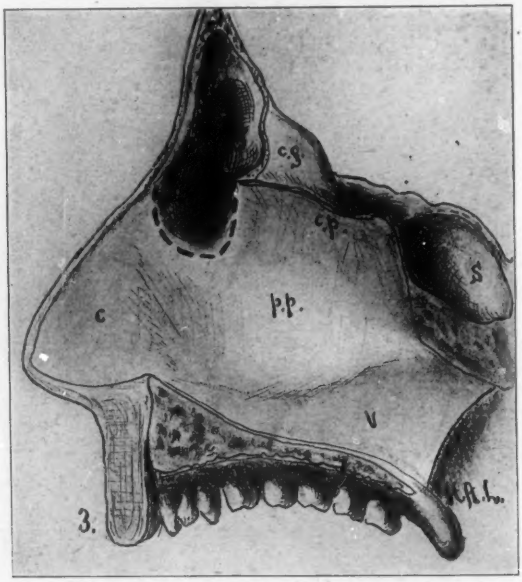

Figure 3. Nasal septum seen in Figure 2 after removal of floor of both sinuses, looking into the right sinus. The median projection of the crista galli and cribriform plate region is shown, also the portion removed by burrs from the perpendicular plate of the ethmoid, thus allowing easy access to both sinuses through either nostril.

and many favorable results be obtained but there are serious objections to very radical, intra-nasal methods. One can never be sure of the local anatomy without direct inspection or know just where the end of the instrument is cutting and such operating calls for the highest degree of skill. Even then, in the absence of direct inspection, there is doubt as to the thoroughness of bone removal and there is always an element of danger and uncertainty. Furthermore, the sinus itself cannot be properly inspected and, if neces-

sary, treated. If a field of operation is not open to inspection and the various steps carried out with precision, it is to that extent "blind operating."

However, either as a means of cure or as a preliminary step for more radical measures, the front portion of the middle turbinate and the adjacent cells should be removed.

2. *Extra-nasal methods:* These are generally combined with certain intra-nasal operating. The external opening serves as a

Figure 4. Outer wall of right nasal fossa. Arrow passes from sinus to infundibulum, between ethmoid bulla (B) and unciform process (u). Portion of middle turbinate removed: ag, agger nasi cell at front of middle turbinate.

means of exposing the sinus cavity both for inspection and for the purpose of enlarging the opening into the nose. The Ogston-Luc method is a step in the right direction for the external opening is not large enough to give rise to deformity but frequently the nasal opening proved to be too small and subsequently filled with soft tissue. There was no aim here to destroy the sinus.

The Kunt method was an attempt to destroy the sinus by letting the facial wall collapse, while the Jansen method sought the same

object by removal of the orbital wall and, still more radical was Riedel's operation which removes both facial and orbital walls. All of these operations produced unnecessary deformity. Of course many cures followed but failure was due either to inability to destroy the sinus or to inefficient drainage if any sinus remained.

These methods have been largely given up for the more recent Killian technic. This combines both the attempt to destroy the sinus and to establish efficient drainage. Its advantages are that

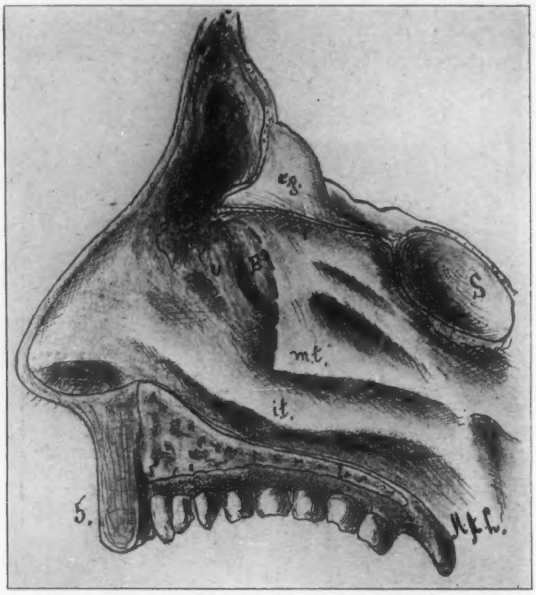

Figure 5. Outer wall of nasal fossa seen in Figure 4 after removal of dense bone forming floor of right sinus leaving a thin anterior wall; u, unciform process broken off in vicinity of ethmoid cells opposite the lachrymal bone.

the sinus can be thoroughly and safely explored and the ethmoid region exposed to treatment, and the results are said to be better than those of any of the above methods. The disadvantages of this method are the following: An unnecessary deformity results depending upon the skill of the operator and the size of the sinus. The contents of the orbit are frequently injured, including the lachrymal apparatus, the superior oblique muscle, and the supra-orbital nerve and vessels. Soft parts are bruised and there is

much subsequent edema and sometimes considerable sepsis. The great objection to this method is that the wall of bone, comprising the upper portions of the lachrymal bone and nasal process of the superior maxilla and the adjacent portion of the frontal bone, is removed. This allows the soft parts to sink in and, later, be drawn in by scar tissue, thereby shutting off the distal portion of the sinus which prevents cure. It must be remembered that all of the sinus is in the frontal bone, hence, any narrowing at the level of its floor is disadvantageous. In all of the very chronic cases Nature tends to lessen the size of the sinus by filling in the narrow angles and borders with permanent scar tissue. Therefore, at operation this should not be removed. For the above reasons the Killian technic

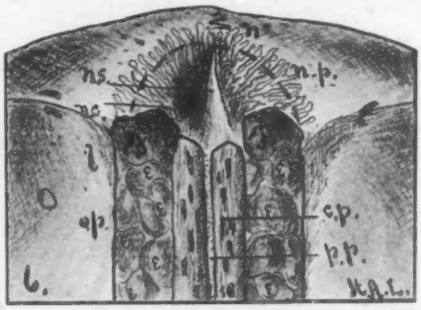

Figure 6. Looking up at the lower surface of the frontal bone disarticulated at the level of the naso-frontal suture; upper portion of ethmoid bone in situ; n and np, broad serrated area for articulation with thickened ends of nasal bones and nasal processes of superior maxillae; ns, nasal spine; nc, nasal crest; F, hiatus frontalis; l, articulation for lachrymal bone; op, os planum; pp, perpendicular plate; cp, cribriform plate external to which is a line representing the upward prolongation of the middle turbinate, still more externally are the ethmoid cells, e; O, roof of orbit. Dotted line shows area forming floor of both sinuses to be removed.

leaves much to be desired in an operation for the cure of these obstinate cases.

An operation for chronic cases: The writer has practiced for the last four years a technic which aims to be both conservative and radical, incorporating certain modifications from time to time. It is believed to be indicated in all chronic cases requiring any very radical or any external operation. It is a safe method in the hands of anyone competent to do frontal sinus surgery. The convalescence is short, but little after-treatment is required, and most of our cases have been discharged as cured in a few weeks. In a series of thirty cases, under the care of Dr. O. A. Lothrop or my-

self, there was one fatality due to a pulmonary embolus which was secondary to a mastoiditis operated upon shortly before the frontal sinus operation. This death must, therefore, have only a remote connection with the last operation. One case was opened a second time because of persisting nasal discharge and the sinus was found full of polyps. In this instance the sinus was not carefully curetted at the first operation. The amount of curetting must always depend upon the condition of the soft parts when exposed to view at operation. Membrane which tends to form polyps should be carefully curetted, as should exuberant granulations, but, as a rule, the

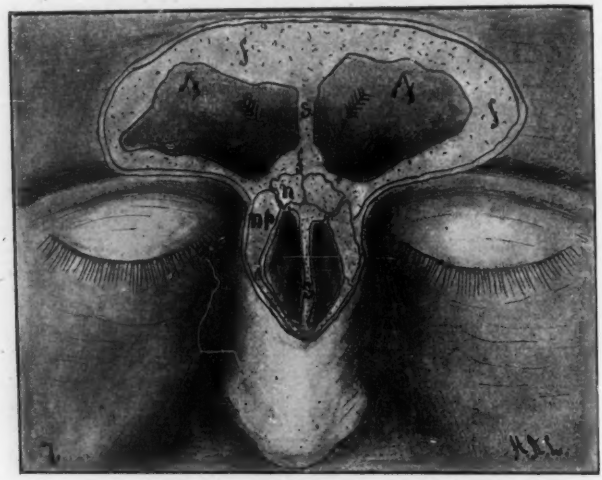

Figure 7. Front wall of both sinuses and of upper nasal fossae removed showing dense mass of bone behind the base of nose forming median portion of floor of sinuses: n, end of nasal bone; np, nasal process; s, septum of frontal sinus and of nose. Arrows pass through ostia to nose.

mucous membrane inflammation subsides when the outlet for drainage is adquate. It is unwise to curette the sinus wall so as to expose the bone for its nutrition is endangered thereby. In many of the cases the patients have not complained of any nasal discharge dating from operation and in most instances it has ceased in the course of a few weeks. The relief from pain is immediate and there remains for a few days only such tenderness as is incidental to the operation. The most troublesome, previously existing fistulae are closed at once and in no case has a new external fistula developed. The swelling of soft parts is a minimum and, at

most, is limited to a little edema of the upper lid, insufficient to close the eye. In the later operations of our series, supra-orbital anesthesia has been avoided. In all cases both sinuses have been utilized in order to obtain all the floor space the anatomy will allow, regardless of whether the sinusitis was single or double. About one-third of the cases had trouble on both sides. In no instance has any complication occurred in the previous healthy side and, in the presence of satisfactory drainage, we do not believe such would occur. We have known of acute sinusitis following simple exploration of a healthy sinus where the wound of entrance

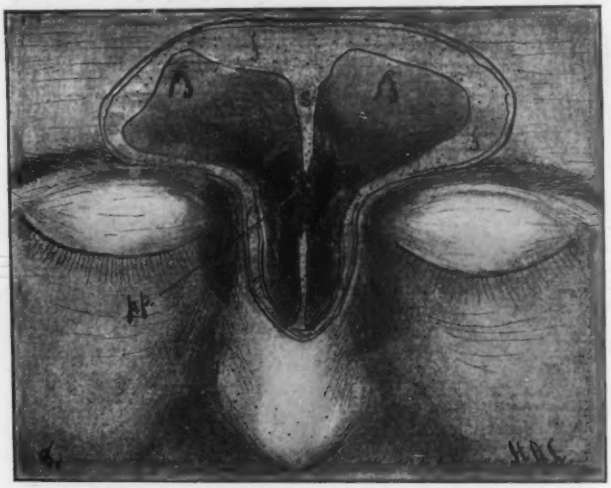

Figure 8. Same region as shown in Figure 7 after removal with burr drills and rasps, looking into the nasal fossae; pp, perpendicular plate deeply notched. A probe entering either naris would pass readily into either sinus.

was closed and the trouble was consequent on infected blood clot retained in the otherwise undisturbed sinus. Furthermore, it is probable that the healthy mucous membrane from the normal sinus epidermizes the diseased one. Our results demonstrate the wisdom and harmlessness of utilizing the floor of both sinuses in all cases, irrespective of the presence of single or double sinusitis. The efficacy is much increased and the technic made easier, all being accomplished by means of a single small external opening combined with intra-nasal manipulations, so that at all times the cutting instrument is in view.

The essential feature of this technic is the removal of the entire nasal floor of both sinuses, laterally from lachrymal to lachrymal bone and, antero-posteriorly, from the thinned bone at the region of the naso-frontal suture back to the posterior wall of the sinus near the crista galli, together with the interfrontal and the underlying inter-nasal septa.

Anatomy. In previous articles (*Annals of Surgery*, June, 1914, and *Journal of the American Medical Association*, July 10, 1915), the essential anatomy has been carefully considered and some cases reported; hence, these matters will be only briefly mentioned here.

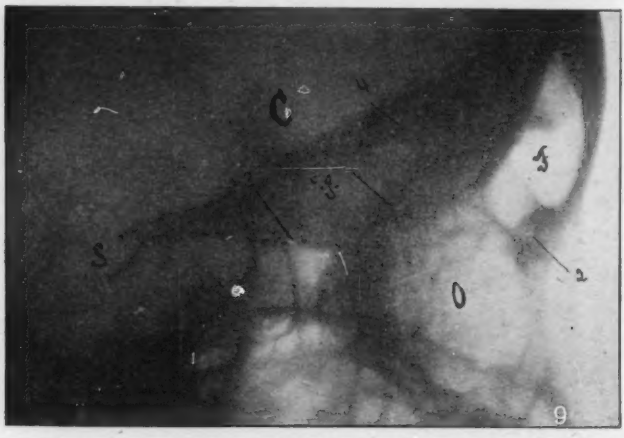

Figure 9. Lateral Roentgenogram showing dense bone (2) at the base of a large frontal sinus, and the relative distance from the base of the nose to the crista galli (cg); 3, cribriform plate; O, orbit; S. sella turcica.

The ostium frontale is situated in the floor of the sinus toward the posterior angle and there should be no exploration behind or internal to this point on account of the posterior wall and cribriform plate. Around this opening are thin walls making anterior ethmoid cells and these are readily broken through. As shown in the various cuts, there is always thick and dense bone representing the upper thickened ends of the nasal bones and nasal processes of the maxillæ, and the region where the interfrontal septum and median plate of the ethmoid and frontal spine come together. This makes a confluent mass at the floor of the sinus, not only in the median line but extending laterally in front of the ethmoid cells just referred to. All of this is to be removed by burrs or rasps. It is so far for-

ward and around a corner, so to speak, that it is not open to intranasal inspection. For this reason it is unwise to remove this dense bone without observing every movement of the instrument through an opening from above. The part is accessible only to rasps and burr drills, particularly those with curved shanks.

X-ray: An antero-posterior and a lateral view should be taken prior to operation. Although of some value in aiding diagnosis, the chief object is to outline the sinus. The front view gives the height

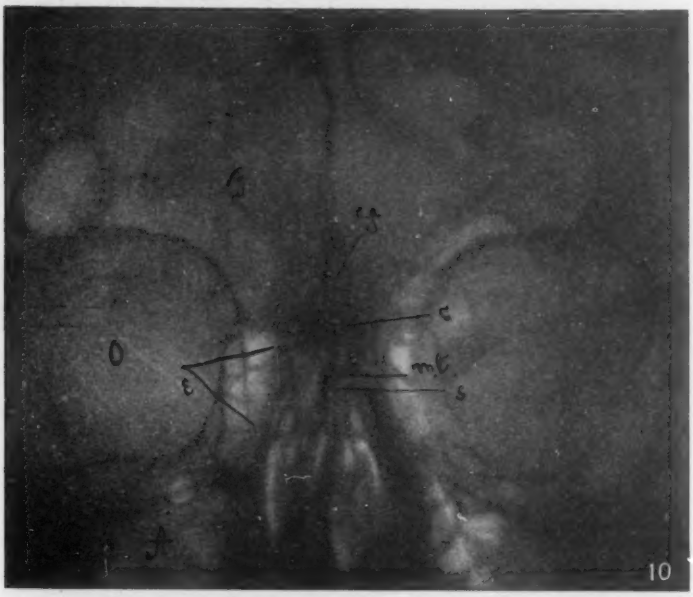

Figure 10. Anteroposterior roentgenogram showing the height and lateral extent of the sinuses: O, orbits between the inner boundaries of which is the nasal floor of the sinuses, all of which is to be removed; cg, crista galli; C, level of cribriform plate; s, nasal septum, mt, middle turbinate; E, ethmoid cells; A, antrum.

and breadth and the lateral view shows the distance between the base of the nose and the crista galli. X-ray portrayal is of considerable importance.

Transillumination is of minor importance and adds but little information.

Technic of operation: As previously mentioned, the anterior end of the middle turbinate and adjacent ethmoid cells have already been removed with the hope of obtaining a cure and, on failure of this, the following operation is advised:

A solution of cocain (4 per cent) in adrenalin (1 to 6000) is applied on a pledget of cotton to the upper anterior portion of the nasal cavity just before administering a general anesthetic and this is not removed until the beginning of the operation. Ether is the choice of anesthetic, started in the usual way but continued during the operation through a curved, metal tube reaching to the pharynx, so as not to interfere with the operator.

Patient in a semi-upright position. Eyebrow not shaven. Posterior nares plugged from the pharynx, thus avoiding hemorrhage posteriorly. This is preferable to introducing tampons through the anterior nares.

An incision is made in the eyebrow down to the bone starting just internal to the supra-orbital foramen, which can be felt, and running median in the brow for about one inch. The supra-orbital nerve should not be divided. Elevate periosteum and remove an oval piece of bone, entering the sinus with small chisels, exploring with a probe, and then enlarging the opening with bone forceps so that it is about three-fourths of an inch long horizontally. The inner end of the opening is in the facial wall, a little external to the front angle of the sinus. The orbital soft parts or any bone below the orbital margin are not to be disturbed. The sinus is then cleared of pus, granulations or polyps. Pass a probe through the ostium frontale, situated near the posterior angle of the sinus, down into the nose and leave it in position until the cell structure around it has been broken with small curettes passed down from above and an appreciable enlargement made into the nose. One of the smaller curved rasps, devised by Dr. O. A. Lothrop, may be passed into the nose and the tip made to appear in the sinus and by careful motions, keeping the tip constantly in view, the enlargement is continued, in a general way forward from the ostium, from time to time cutting laterally on both sides. On no account is any bone to be removed posterior or internal to the ostium, for obvious reasons. Presently, larger rasps and the burr drills are introduced from below and can be used at the discretion of the operator. Most of the work is accomplished with the burrs, just as a dentist reams out the cavity of a tooth, the burr always in sight through the external opening. The opposite sinus is opened either by carefully pushing a pointed instrument through the interfrontal septum or by burring away the lower front corner of this septum. The object is to remove the dense bone at the base of the nose in front and laterally, nearly down to the periosteum, as shown in the cuts. This bony mass is made up of the thickened

upper ends of the nasal bones and nasal processes of the maxilla and the adjacent portions of the interfrontal septum and the middle plate of the ethmoid. With the large burr a considerable part of the ethmoid plate, situated just below the sinus, is removed but not extending quite to the upper border of the triangular cartilage. Remove all the interfrontal septum and any septa that partially subdivide the sinuses. Break through a frontal bulla if one is present. After the median partition has been burred through, it will be of advantage to work through both nostrils, using care not to injure the mucous membrane of the septum when introducing or removing the instruments. The excavation is complete only when all the bone in this region has been made thin, as shown in the cuts. A finger placed externally over the lachrymal bones will serve as a good guide against their injury while using the burr. Finally, according to the indications, as much of the ethmoid mass may be removed as is deemed wise, using burrs and curettes. The antrum may, likewise, be opened into the nose, as is sometimes indicated. The burrs used are those devised by Tilley and Ballenger for antrum work, those possessing the curved shank being most serviceable. Hemorrhage ceases long before the excavation is completed. Either sinus is then readily accessible from either nostril. At the end, note that the sinus wall is clean and smooth. Curette deeper for granulations and polyps but do not denude healthy bone of its periosteum. Do not disturb mucous membrane which is simply inflamed. The duration of the average operation should not be more than one hour.

The external wound is to be closed at once and no drain left in the nose. Apply a sterile gauze dressing for the first twenty-four hours, then a simple cocoon. Do not irrigate the sinus or nose until several days after the operation, for the parts will drain themselves. No hemorrhage has followed our operations. It is wise to keep the patient in bed from one to a few days, according to circumstances. Until the injured parts are healed there is a certain amount of exudate, which is rarely troublesome and which soon becomes insignificant. The scar of incision is in the eyebrow and should be scarcely perceptible and the bony opening is too narrow to allow depression.

101 Beacon Street.

THE RELATION OF OBSTRUCTION OF THE EUSTACHIAN TUBE TO LOCAL AND SYSTEMIC CONDITIONS AND TO PROGNOSIS REGARDING RESTORATION OF HEARING.

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This study is based on the observation of ninety cases selected because of the prominence among their symptoms of obstruction of the Eustachian tube.

Obstruction of the Eustachian tube may be *temporary*, due to boggy swelling or inflammation; or *permanent*, due to formation of scar tissue with contraction. The causes of the obstruction are swelling of the mucous membrane (congestion or inflammation), the pressure of hypertrophied lymphoid tissue around the tube, hyperplasia (fibrosis) and the formation of scar tissue in the healing of ulcerations.

The location of the obstruction may be at the *Eustachian fossa* (lymphoid tissue, granulation tissue, papilloma, edema), at the *mouth of the tube* (fibrosis, scar tissue), in the *course of the tube* (valve-like webs or pockets), or at the *isthmus* (contraction by scar tissue).

The obstruction may be a sequel of vasomotor paresis (acidosis), ulceration, chronic infection or irritation (tonsils or teeth).

It may be relieved, *at the fossa*, by curettage; *at the mouth*, by incision with the salpingotome and dilatation by bougies; in the *course of the tube* and at the *isthmus*, by electrolysis and the use of bougies.

I have been prompted to write on this subject because of the large number of patients who come for treatment and state that they have been told that they are beyond help when, as a matter of fact, they can be helped.

However, conclusions regarding Eustachian tube obstruction cannot be drawn from brief observation of cases. They must be the fruit of a thorough knowledge of each case and this applies especially to prognosis.

Of the 90 cases presenting marked Eustachian obstruction, 33 of them may be classed as acute and 57 as chronic. Of the acute cases 21 were males and 12 were females. Of the chronic cases 27 were males and 30 females.

The ages ranged in the acute cases from 7 to 52 years; in the chronic cases from 10 to 80 years.

In 3 of the 33 acute cases no cause for the obstfuction could be ascertained (9 1-11 per cent). The other 30 cases had some relation to other local conditions and the general health through association with, or as sequellae of, various conditions.

As direct exciting causes the following are given in the 33 cases:

	Cases	Percent
"Colds" (infection and toxemia) with purulent epipharyngitis	6	18 2/11
Grippe with purulent epipharyngitis	13	39 1/3
Sea and plunge bathing	4	12 4/33
Otitis media purulenta acuta	4	12 4/33
Otitis media catarrhalis acuta	1	3 1/33
Tonsillitis (acute)	1	3 1/33
Gout	1	3 1/33
Focal infection in teeth	1	3 1/33
Ingestion of quinin	1	3 1/33

Analyzing these cases still further, they may be classified as follows:

	Cases	Percent
Without discoverable cause	3	9 1/11
"Colds" (toxemia) with purulent epipharyngitis alone	4	12 4/33
"Colds" with Ot. Med. Pur. Ac. and mastoiditis	1	3 1/33
"Colds" with diseased tonsils	1	3 1/33
Grippe with purulent epipharyngitis alone	6	18 2/11
Grippe with Ot. Med. Pur. Ac.	2	6 2/33
Grippe with Ot. Med. Pur. Ac. and inflamed adenoids	1	3 1/33
Grippe with Ot. Med. Pur. Ac. and focal infection in teeth	1	3 1/33
Grippe with diseased tonsils	1	3 1/33
Grippe with diseased tonsils and focal infection in teeth	1	3 1/33
Grippe with inflamed adenoids and impacted wisdom tooth	1	3 1/33
Sea bathing alone	1	3 1/33
Sea bathing causing labyrinthitis	1	3 1/33
Sea bathing with deviated septum	1	3 1/33
Sea bathing with Ot. Med. Pur. Ac.	1	3 1/33
Ot. Med. Pur. Ac. alone	2	6 2/33
Ot. Med. Pur. Ac. with diseased tonsils	1	3 1/33
Ot. Med. Pur. Ac. with syphilis	1	3 1/33
Ot. Med. Cat. Ac. alone	1	3 1/33
Diseased tonsils alone	1	3 1/33
Gout alone	1	3 1/33
Focal infection alone	1	3 1/33
Ingestion of quinin and diseased tonsil	1	3 1/33

There were present as predisposing causes:

	Cases	Percent
Deviated septum in	1	3 1/33
Diseased tonsils in	5	15 5/33
Diseased adenoids	2	6 2/33
Focal infection in teeth	2	6 2/33
Impacted wisdom tooth	1	3 1/33
Syphilis	1	3 1/33
Gout	1	3 1/33

It will be noted that but one acute case was associated with obstruction of the corresponding naris by a deviated septum. Formerly a larger percentage of the cases would have been laid at the door of nasal obstruction; but since we have learned to look for other causes the cases listed as due to obstruction of the nares have lessened in number.

The abnormal conditions of the teeth listed as predisposing causes among the acute cases were alveolar abscess (focal infection), pyorrhea, impacted wisdom tooth. As to symptomatology,

the chief complaint, in these acute cases, as given by the patient, was as follows:

	Cases
"Cold in the ears"	4
"Grippe in the ears"	1
Stuffiness of the ears alone	4
Stuffiness and deafness	1
Deafness and stuffiness	2
Stuffiness and tinnitus	1
Stuffiness and soreness of the ears	1
Stuffiness, deafness and pus from naso-pharynx	1
Pain in the ear alone	1
Pain in the ear and discharge	1
Pain in the ear and irritable throat	1
Pain in the ear and heaviness of ear	1
Pain in the ear, deafness and autophony	1
Pain in the ear and tonsillitis	1
Pain in the ear, stuffiness and heavy, dead feeling	1
Pain behind ear, discharge and deafness	1
Discharge from ear, pain and deafness	1
Deafness and autophony	1
Deafness and tinnitus	1
Autophony and discharge	1
Tonsillitis	1
Throat and ear trouble and stiffness of neck	1
Dizziness, deafness, pressure and pain	1
Nausea, headache and vomiting	1

When Eustachian tube obstruction, due to swelling of the mucous membrane, is present, the common cold will be recovered from sooner, the incident head distress lessened and the hearing conserved by treating the Eustachian tubes locally in each case.

In cases of Eustachian obstruction accompanying influenza, ulceration of the lining of the tube often takes place. This, if untreated, results in contraction of the lumen of the tube by cicatricial tissue during the healing process. A large number of the chronic cases are to be referred to this cause.

In these cases with ulceration of the tube the cotton on the Eustachian applicator is blood stained by passage over the ulcerated areas, on its way through the tube to the middle ear. The applicator also often finds pockets in the wall of the tube, or valve-like webs of membrane.

The presence of adenoids in the nasopharynx determines an increase in and swelling of the lymphoid tissue surrounding the proximal end of the Eustachian tube with consequent closure of the tubal opening. Inflamed adenoids are found in patients as old as 66 to 75 years. Since the employment of the nasopharyngoscope as a routine measure in the examination of each patient coming to us, the fact has been forced upon our attention that a large percentage (perhaps 50 per cent) of adults have the remains of adenoids in their nasopharynges which in many cases swell and harbor infection whenever an attack of "cold" or influenza supervenes.

In the Transactions of the American Laryngological Association for June, 1915, Dr. Jas. E. Logan, of Kansas City, is quoted

as declaring: "Nothing has been said of one source of focal infection which, to my mind, is very important—the vault of the pharynx."

This remark applies also to hypertrophied or diseased tonsils. In fact, all parts of Waldeyer's ring are intimately related, because of likeness of structure, and intimately associated by means of direct links of lymphoid tissue, so that any pathological condition will influence similar tissue around the fossa of the Eustachian tubes and the inner surface of the tube itself to the isthmus. Directly by continuity of tissue, and through lymph and blood vessels, as well as reflexly through nerves, pathological conditions of the teeth and jaws will tend to affect the Eustachian tubes. In every case of acute or chronic Eustachian catarrh, recent developments show the necessity of investigating the condition of the teeth. In this series of acute cases 12 4-33 per cent were associated with diseases of the teeth; while another 15 5-33 per cent were associated with diseased tonsils. This, therefore, constitutes 27 3-11 per cent or more than one-fourth of all the cases. It must be acknowledged that this is a fair proportion.

If there be doubt in any mind as to the causative relation between disease of the tonsil and pathological conditions in neighboring organs and tissues, I would call attention to a case of meningitis following tonsillitis reported by E. Siemerling.[1] The patient was a boy of 15 and the meningitis developed in connection with a febrile sore throat. The meningitis was evidently serous, for recovery followed after two months of treatment. If a serous meningitis can be thus set up by diseased tonsils through the lymph or blood current, or both, it is certainly not far-fetched to believe that the condition of the Eustachian tubes can be and is deeply affected by the condition of the tonsils.

Cases in which diseased teeth, alveolar sockets or impacted wisdom tooth buds are found will present reddened anterior faucial pillars, thus tending to show that irritation or infection by way of lymphatics and blood vessels, or by continuity of tissue travels toward the Eustachian tubes. In the Transactions of the American Laryngological Association, June, 1915, Dr. Otto Freer, of Chicago, is quoted as saying: "The lymphatics usually tell the story of focal infection." In one case of the writer's, after tonsillectomy, the patient, after many examinations, radiographs of the jaws (which revealed seven tooth sockets diseased by pyorrhea) and repeated visits to the dentist, was found to have an abscess of the lower right wisdom tooth socket which had existed long enough to ab-

1. Deutsche mediz. Woch., Nov. 20, XXXIX., No. 47, pp. 2281-2328.

sorb one of the roots of the tooth in its entirety, and that without any local pain. Later another abscess developed in a left lower molar. The pain had been neuralgic in character, distributed over the areas supplied by the terminal filaments of the fifth cranial nerve over the scalp.

The tooth conditions to be sought for are impacted wisdom tooth buds, slowly erupting wisdom teeth, abscess of tooth sockets, pressure by tooth roots on the inferior maxillary nerve in its canal in the mandible, pyorrhea with absorption of alveolar edge, malposed teeth, tooth in antrum.

The Eustachian tube involvement accompanying mastoiditis is but a part of the condition which causes the involvement of the mastoid bone.

General conditions, such as gout and syphilis, general infection from a focal point, or drugs such as quinin or the salicylates are liable to affect the Eustachian tubes, as they affect other parts of the auditory apparatus.

As an example of the manner in which diseased teeth will cause local and general infection and affect both the Eustachian tube and distant organs, thus obscuring the diagnosis and making of a prognosis difficult, the following case is described:

Mrs. C. B. S., referred by a colleague, March 27, 1914; age 36. Decidedly cachectic in appearance and very feeble. The patient states that she has a sensitive large intestine, especially the transverse colon. For four weeks the patient was in bed with nausea, not preceded by headache. The headache followed the nausea. A gall-bladder operation had been considered. More recently she had vomiting, not projectile in character. The patient came for examination to determine whether the cause of the nausea and vomiting lay perhaps in the ears or eyes. In December, after motoring in a strong wind, the patient had pain in the left ear. This persisted for two weeks. She also reports having pain in the left eye when driving in the wind. The patient had scarlet fever when 6 years of age and typhoid fever when about 15 years of age.

Examination—Revolving test to the right shows prompt nystagmus of 20 seconds' duration; to the left, 30 seconds' duration. The test develops pronounced vertigo.

The left Eustachian tube is decidedly occluded and does not admit either an Eustachian applicator or sound. The left drum is normal in appearance. The right Eustachian tube is patulous. The right drum shows congestion along the handle of the malleus.

The external auditory canals are tender and easily irritated by the speculum. Pressure of the speculum in the right canal causes a red color reflex in the right eye.

A much diseased wisdom tooth is found in both right and left mandibles.

The patient has been having pain in the region of the left ear anterior to the external auditory canal. She hears all the tuning forks including the Dench. *Weber* equal. *Rinne* positive. *Schwabach* (C^1-256 d. v.) right ear: bone conduction, 8 seconds; air conduction, 13 seconds. Left ear: bone conduction, 5 seconds; air conduction, 17 seconds. With C^2-512 d. v., right ear: bone conduction, 12 seconds; air conduction, 25 seconds. Left ear: bone conduction, 10 seconds; air conduction, 17 seconds. Both air and bone conduction shortened. Whole gamut of Galton whistle appreciated. Hearing by acoumeter and loud watch normal.

Treatment of this case continued from March 27 to April 25. On March 30 the patient reported that the one treatment on March 27 had afforded her much relief. This treatment had consisted of opening and medicating the tubes. On March 30 the left Eustachian fossa was curetted and this curettement was repeated on April 4. Electrolysis was used in the left tube on April 10. Each of these procedures was followed by bougieing of the tube.

On April 7 the left lower wisdom tooth was extracted and the oral surgeon found the alveolus diseased. As late as September spicules of bone were still coming away from the socket.

The patient was discharged as cured the latter part of April.

At the patient's first visit the eyes had been refracted under hematropin. The fundi were normal under ophthalmoscopy. Retinoscopy gave: O.D. plus .50 spherical; O.S. plus 1.50 spherical, total error. Prescribed O.D. plus .50 spherical; O.S. plus 1.00 spherical. There was no muscular imbalance.

On September 10, the patient's husband reported that there had been no trouble since April, all nausea having disappeared at the latter time. His wife had gained ten pounds in weight which brought her weight up to the normal figure of 130 pounds.

Here is a case in which a diseased mandible had caused locally disease of the corresponding Eustachian tube with the resulting symptoms, and with further pressure effect on the labyrinth. The effect on the health consisted in a general infection affecting especially the gall bladder. Such symptoms as had appeared had called attention to the abdominal organs until her physician had,

by process of elimination, reduced the areas to be investigated down to the eyes and ears. The point in this case is that if the lady had not been advised to have an examination of her ears, an operation on the gall bladder would have been performed, especially as the radiographic plate showed apparent disease in that location. The gall bladder had been infected from the teeth as the focal infection.

In one acute case, G. B., age 16, at the first examination September 30, 1913, the turning test showed very tardy and short lived nystagmus. On October 9, after treatment had opened the tube, the turning test elicited prompt response of normal duration. In such a case, no doubt, the closure of the Eustachian tube brings about such a change in air pressure as to affect the labyrinth. If one has the temerity to make a prognosis from the first examination he will find that proper treatment will soon render the prognosis invalid. Closure of the Eustachian tubes magnifies the symptoms resulting from pathological conditions in the middle ear. Hearing tests are much dependent on the condition of the tubes. The ratio between bone and air conduction can be profoundly affected by Eustachian obstruction. Opening of the tubes changes this ratio toward normal.

It is hardly likely that Eustachian tubes will remain permanently normal when diseased tonsils remain in their neighborhood. In spite of the claim that tonsils have been enucleated wholesale without due reason, the writer believes that many septic tonsils, which ought to be removed, are still left in situ. Some patients reject tonsillectomy because they have read the writings of those who oppose even a reasonable percentage of tonsillectomies.

Study of these acute cases shows that there are some cases of simple closure of the Eustachian tube which may be easily relieved by treatment with the Eustachian catheter, applicator and bougie; that an attack of influenza or ordinary "cold" determines secondary tubitis and otitis media when the surrounding tissues are pathological, as, for instance, when there are diseased teeth, tonsils or adenoids; that patients who return with exacerbations of tubal obstruction are apt to have diseased teeth, tonsils or adenoids; that when a case of otitis media with obstruction of the Eustachian tubes presents itself it is not enough to prescribe hot ear douches, or these with nasal douches, but the Eustachian tube must be opened to furnish drainage, and the cause of the condition present should be sought in infection from the nose, adenoids, tonsils or teeth.

In some of the cases considered in this series acute boggy closure of the Eustachian tubes appears, on analysis, to be non-infectious, and merely a local manifestation of an acidosis or gouty condition. These patients present sometimes a rhinorrhea. Patients have come to the writer who had been treated locally in the nose and throat two or three times a week for long periods of time, when, by a process of elimination, the real cause was found to be an acidosis, demanding general internal and dietetic treatment.

Swimming and diving in plunges containing infectious water, or the water of which forces infectious material into the tubes, is at the bottom of a fair percentage of these cases, some even showing irritation of the labyrinth.

Regarding results of treatment in this series of 33 acute cases careful search for the real cause and careful treatment brought about a cure in all of them.

Of the fifty-seven chronic cases, two were cases of simple obstruction of the Eustachian tube without discoverable complication (3½ per cent).

In 24 there was chronic catarrhal otitis media, including the dry or hyperplastic variety (42 1-9 per cent).

In 14 there was deviation of the nasal septum, one of these cases showing complete closure of the right naris by old fibrous tissue adhesions, the result of former treatment, probably cauterization (24½ per cent).

Ten were secondary to abnormal conditions of the tonsils (17½ per cent).

Six cases were regarded as due to intestinal toxemia (10½ per cent).

Five were secondary to abnormal conditions of the teeth (8 4-5 per cent).

Five had inflamed adenoids (8 4-5 per cent).

Four had labyrinthitis, one with the Menière symptom complex (7 1-57 per cent).

Four were regarded as due to gout (7 1-57 per cent).

Three had adhesions in the fossa of Rosenmueller (5 15-57 per cent).

Two had damaged labyrinths due to injury—powder explosion and kick of horse—(3½ per cent).

Two had taken large doses of quinin (3½ per cent).

Two had mastoiditis (3½ per cent).

One had chronic nasal sinusitis (1 4-5 per cent).

In one case the condition was traced to swimming in plunges (1 4-5 per cent).

The cases associated with diseased teeth or tonsils in this list amount to 26 3-10 per cent. Add to this the 24¼ per cent furnished by the acute cases and the total is 50½ per cent, or more than one-half of the cases. Adding the 15 per cent due to adenoids the grand total from these three conditions is 65 per cent. This simply argues for a lowering of resistance in the Eustachian tube by constant infection or irritation from those neighboring organs, the pharyngeal tonsils, the teeth and Luschka's tonsil.

As to the predisposing causes presented by these chronic cases: Fourteen were associated with nasal obstruction by deviated septum. Ten were associated with diseased tonsils. Five were associated with abnormal conditions of the teeth, as ectopia, pyorrhea or impacted wisdom tooth buds. Five were associated with diseased adenoids. Four were associated with nasal obstruction by massive turbinate. Four cases were gouty. Two cases accompanied mastoiditis. One case accompanied nephritis. One case accompanied hereditary sclerosis. One case had atrophic rhinitis.

The abnormal conditions of the teeth which occurred in five cases included the following: One boy, aged 19, had the lower left wisdom tooth impacted against the neck of the second molar, two upper wisdom teeth erupting slowly, and the upper right canine tooth buried in the jaw, lying horizontally above the roots of the two bicuspids, its cusp pointing forward. One woman, aged 35, had never erupted any wisdom teeth. In one man, aged 26, radiographs showed his lower right bicuspid impacted below the incisors and lying lingually to their roots. In addition his left lateral upper incisor was painful, the right submaxillary ganglion tender, the upper left second molar had been giving trouble and there was tenderness at the left infra-orbital foramen. One woman, aged 75, had chronic pyorrhea. One woman, aged 23, had four slowly erupting wisdom teeth. The two lower were in good position, the two upper erupting labially.

As exciting causes in the chronic list should be given: Toxemia, probably intestinal, 6 cases; influenza, 6 cases; sinusitis, 1 case; chronic focal infection, 1 case; attenuated syphilis (probably), 3 cases.

Twenty-four cases presented those symptoms which lead to a diagnosis of chronic catarrhal otitis media, either the moist variety or the dry hyperplastic form which is, however, not catarrhal according to the true sense of the term catarrh.

General symptoms in the chronic cases were as follows: One case presented vertigo, deafness and mental confusion. This indicated a neurotic base. One other case appeared to be purely neurotic. One case had subjective deafness from inattention. Her hearing was fair under tests. One case had syncopal attacks which were relieved by restoring the tubes to a normal condition. Four cases presented labyrinthitis. In one of these cases there were characteristic attacks of the Menière syndrome, resulting in typical neurasthenia. This patient had consulted a gastroenterologist believing that the symptoms pointed to the stomach, intestines or liver as the chief seat of trouble. Symptoms of neurosis or neurasthenia are complicated and magnified by Eustachian obstruction. Another labyrinth case, in which the chief complaint was tinnitus proved secondary to focal infection from puerperal septicema.

The chief complaint as given by the patients was as follows:

	Cases
Deafness	15
Deafness and tinnitus	9
Deafness and stuffiness	2
Deafness, stuffiness and purulent discharge	1
Stuffiness of ears	7
Stuffiness and earache	1
Stuffiness and deafness	1
Stuffiness, deafness and tinnitus	1
Stuffiness and hyperesthesia of the tubes	1
Stuffiness, deafness, vertigo, mental confusion	1
Tinnitus (becoming insane)	6
Tinnitus and deafness	2
Tinnitus and apoplectiform attacks of labyrinthitis	1
Tinnitus and autophony	1
Tinnitus and syncopal attacks with spasm of tensor tympani	1
Tinnitus and vertigo	1
Pain and stuffiness	1
Throat colds	1
Purulent discharge	1
Nasal obstruction and stuffiness of ears	1

As an example of the effect of slowly erupting wisdom teeth on the Eustachian tubes and hearing, the following case is reported: Mrs. A. E. M., age 23, June 10, 1914. Chief complaint is deafness. The patient had pulsating tinnitus which has ceased. For two years there has been gradual loss of hearing. The patient says "colds" settle in her ears. Examination shows no rhinitis now. Her mother has been hard of hearing for 10 to 12 years; a sister, 37 years of age, has been hard of hearing for 6 or 7 years. The patient had typhoid malaria at the age of 4 years. Pertussis in childhood. Eruption of her wisdom teeth began two years ago. It is to be noted that failure of hearing began two years ago also.

Examination: Drums are gray and slightly retracted, but vibrate well with the otoscope. *Weber* is localized to the right. *Rinne*,

positive on the right and the left for C^4 and C^8; negative for other forks. *Dench* fork not heard. *Schwabach* with C^2; right, bone conduction, 21 seconds; air conduction, 8 seconds; left, bone conduction, 13 seconds; air conduction, 10 seconds. *Accoumeter*: right, 10 feet; left, 17 feet. *Watch*, right, 2½ feet; left, 3 feet. *Turning test* gave: to right, nystagmus of brief duration; to left, of longer duration, but not up to normal. The patient has four wisdom teeth erupting. Both Eustachian tubes closed with boggy swelling, the right less so than the left.

Diagnosis: Deafness due to boggy closure of Eustachian tubes. No good evidence of a true otitis media. Catarrhalis chronica. Amenable to improvement.

In this case there was, no doubt, an hereditary tendency to ear involvement. No symptoms of otosclerosis.

After ten days' treatment the hearing was better and both Eustachian tubes took a No. 5 bougie easily. By July 11, eruption of the wisdom teeth had progresed, the upper right being farthest advanced, the lower right next, the lower left next, the upper left least. The Eustachian tubes were easily inflated and a bougie could be introduced readily. Treatment was continued until both tubes were patulous and the Eustachian applicator could be introduced for the full length.

December 12, 1915, the patient reported good hearing, the wisdom teeth having completely erupted; the two lower were in good position; the uppers pointed labially. No tinnitus. Colds do not settle in the ears. Radiograms of the jaws and extraction of wisdom teeth had been urged but the patient preferred to wait for the eruption of the teeth. Persistent treatment brought about steady improvement of the Eustachian tubes. Complete recovery followed the completion of eruption of the wisdom teeth. Extraction of the latter would have brought about more speedy relief.

As an example of a case in which a very poor prognosis might have been made without any qualms of conscience, but in which treatment brought about desirable results, the following is described: F. C. H., age 31, referred May 28, 1914. The patient was in tears because practically absolute loss of hearing for conversation was threatening to cost him his position. In May, 1913, while in Seattle, his ears felt stuffy, the hearing changed and there was much vertigo. These symptoms would perhaps indicate an attack of right serous labyrinthitis, but there is temptation or tendency to sometimes take too much for granted. A patient reports a sudden or an acute attack characterized by vertigo and deafness. We diagnose

damage to the labyrinth, thinking perhaps there is no probability of cure, when careful examination will show the attack to be due to occlusion of the Eustachian tubes, relief of which will assure the patient useful hearing. For the last year the patient could not hear, for instance, a neighbor's piano, which his wife could hear easily. He had mercurial treatment when a youngster. Wassermann test proved negative.

Examination: Drums retracted, gray, lack of light reflex; vibrate with Siegel otoscope. Appearances do not suggest otosclerosis. Tonsils moderately enlarged. Nasopharynx moist; right Eustachian fossa shows enlarged veins when examined with the nasopharyngoscope. The left tube inflates with strident sound; right one with softer soufle. Both narrow at the isthmus. The left tube takes Nos. 3, 4 and 5 sounds to the isthmus; the right No. 3 only.

Weber to left with C and C^1, equal with other forks. *Rinne* positive to right ear; negative to the left. *Schwabach* with C^1, right ear; bone conduction, 5 seconds; air conduction, 7 seconds; left ear, bone conduction, 5 seconds; air conduction, 4 seconds; C^2 fork is heard by both right and left ears by bone and air conduction; C^3 by air conduction only; right and left, C^4, ditto; C^5, ditto. *Dench* fork is heard by both ears by air conduction. *Galton whistle* heard from 3 to 12 at short distance. *Accoumeter*, right ear, bone conduction only; left ear, 21 inches. *Watch*, negative on both sides. *Turning test*, to right, prompt, but brief, nystagmus; to left, no nystagmus; slight dizziness. *Whispered voice* not heard; *conversational voice*, less than a foot, right and left ears.

June 22. The patient reports better hearing for last two days, except early in the morning. Both tubes take bougies Nos. 3, 4 and 5 as far as the isthmus. C^4 fork heard by air conduction and by bone conduction; C^5 fork by air conduction and by bone conduction, right ear; air conduction only, left ear. The patient hears the whistle from 1 down.

June 23, hears 512 vibrations by air conduction and teeth; 2,048 vibrations by air conduction, teeth and skull. *Accoumeter*, right, ½ inch; left 4 inches. *Watch*, contact left ear. The patient thinks that the pressure of the otoscope in the canal of the right ear causes a feeling of coolness in the right eye. This sensation called attention to the fifth nerve. Radiogram of the jaws shows no impacted wisdom tooth buds.

June 25. The patient reports periods of better hearing and inflation on swallowing. Electrolysis to right tube and isthmus today. June 26. Reports clear hearing last night at 6:30, and yester-

day afternoon he was able to hear the voice of a friend who was talking over the 'phone. Electrolysis to left tube to-day. Right tube inflates readily and takes bougies easily. High frequency current to both ears.

June 29. Broke adhesion in the right fossa of Rosemmueller.

July 2. Acoumeter at 4 inches, right ear; 6 inches, left ear.

July 4. C, 128 and 256, positive by both air conduction and bone conduction, both ears; 512 and 1024, by air conduction and teeth; 2048 by air conduction and bone conduction, right and left. Dench, positive, right and left. Whistle heard the whole gamut by right and left. Heard wife's voice at 10 feet; another person's voice at 8 feet.

At this time the patient was obliged to return to his home in Canada. On January 16, he wrote: "I am mighty glad to be able to say that my hearing is considerably improved over what it was on my return. For about three weeks after my return it was not at all good; then a change for the better set in. During September and October, it was at its best. There are periods when I hear extremely well and other periods when I do not hear so well. However. I am vastly improved over the time when treatment was undertaken."

On May 22, 1915, this patient returned for further treatment. Examination showed the nares normal; tonsils mushy (septic); right Eustachian tube patulous; right drum vibrates with the Siegel otoscope and has better color than when seen last (is slightly opaque); left Eustachian tube inflates but takes neither applicator nor bougies.

This course of treatment consisted of electrolysis to both tubes, each twice, dilatation with bougies at each visit, and tonsillectomy. Rapid improvement followed these procedures, so that at the time of the patient's departure for the North he heard the conversational voice at 24 feet, and the whispered voice at 8 feet..

Examination of this patient by a colleague in San Francisco, late in June, showed improvement in the right ear of nine to one, in the left ear twelve to eight over the condition existing in May when the patient was on his way South. July 17, 1915, the man wrote: "Invariably it is commented that there is a change for the better. I was delighted over a week ago, because, for the first time I heard the postoffice clock strike, about a block away from the office, where our heaviest traffic is. . . . On another occasion, while typewriting, with my mind thus occupied, one of our men came in, speaking the moment he opened the door, and to his astonishment, I answered his question. The distance is approximately 20 feet,

this paralleling the occasion when I heard Miss T— speak from your desk."

This case is described in detail in order to lay stress on the fact that at the time of the first examination a poor prognosis would have been given, had I not refused to make one until becoming better acquainted with the situation. I believe the tonsillectomy was highly necessary in the case, in fact, it was probably indicated at the patient's first visit in 1914, but the tonsils at that time appeared innocuous, simply slightly hypertrophied (when the floor of the Eustachian fossa has dilated veins coursing over it the indication is to study the tonsils and teeth for sources of infection or irritation). That electrolysis opened the isthmi in this case accounts for much of the improvement. The writer employs electrolysis with Duel's set daily with increasingly gratifying results. The set is kept at hand connected with the battery, so it can be used as readily as are the sounds and bougies.

In spite of the fact that the tuning fork tests were not greatly modified in this case, the fact remains that the hearing was greatly improved for practical purposes, the patient retaining his position, where he is very useful to his employers. Syphilis had, no doubt, damaged the cochlea in childhood. However, opening the Eustachian tubes and removing sources of infection and irritation in their neighborhood enabled the man to make the best use of such function as remained to the cochlea.

As to the extremes to which irritation from the teeth can go: Dr. Jas. David McCoy, of this city, related to the writer the case of a young lady who suffered excruciating head pain, diagnosed as neuralgia. This increased progressively until the patient was pronounced insane and confined in a sanatorium. Fortunately, she fell into the hands of one who radiographed her jaws. Impacted wisdom teeth were found. Removal of these brought about a complete cure of the attacks of pain, and the mental condition which they produced.

The pain from impacted teeth is thus sometimes severe. At other times, instead of pain, there is the condition of trismus, a stiff feeling of the jaws with ache or pain anterior to the external auditory canal. In other cases the ache or pain is located in the ears or external auditory canals. In still others it is referred to the mastoid region. The writer in another paper* has described ear reflexes from diseased or malposed teeth as they had presented themselves to him during the course of some years in daily practice.

*Laryngoscope, February, 1914.

Failure of ordinary routine treatment to relieve symptoms, by removing Eustachian obstruction, should lead to search for septic tonsils, diseased or malposed teeth, adenoids, or some abnormal systemic condition. The knowledge of a case has recently come to the writer in which an otologist treated a patient by inflation, for troublesome tinnitus, during the course of two years. At the end of this time another otologist discovered that the woman had a blood pressure so high that the sphygmomanometer could not register it all.

As to the results of treatment in this series of 90 cases. Records show a cure in all the acute cases. In nine of the fifty-seven chronic cases there is no record of complete relief having been obtained:

In one case the patient refused to have impacted teeth removed. One was tubercular and had low recuperative power. One gave good results in response to hearing tests, but claimed she could hear no better; this being due to lack of attention on her part. One case accompanying labyrinthitis did not persist in treatment. One case was no doubt true otosclerosis. Two cases had an acidosis, or diathesis, which brought about exacerbations of bogginess of tissues of the nasopharynx and tubes. In one case the deafness had existed since childhood and the other ear was damaged by the kick of a horse. In one case the condition was secondary to a labyrinthitis due to metastasis during puerperal infection. Three cases of the chronic series presented absolute closure of the mouth of the Eustachian tubes necessitating an incision through Yankauer's speculum, with Yankauer's salpingotome, using Holmes' nasopharyngoscope, curettage of the Eustachian fossa and gradual dilatation of the tubes by electrolysis and bougies. These cases, I take it, had resulted from ulceration, the resulting healing process closing the tube by scar tissue. In many instances the Eustachian applicator, when passed ever so carefully, comes out with the cotton stained with blood. This is to be interpreted as a state of rawness or ulceration within the depths of the tube. Eight of the chronic cases were curetted in the Eustachian fossa with Holmes' curettes, and in five electrolysis was used with Duel's bougies.

In each case of suspected Eustachian obstruction examination should include that with the nasopharyngoscope, Eustachian catheter, Eustachian applicator and Eustachian sounds.

Treatment of Eustachian obstruction calls for the use of the Eustachian catheter, applicator and bougies, and vaccines, as a routine, with the frequent addition of curettage of the fossa and electrolysis of the tube when ordinary treatment fails to give relief. Cases ex-

periencing frequent exacerbation of closure of the tube need treatment by electrolysis for more permanent effect than is produced by the ordinary routine office treatment. The writer's rule is that in any case where the isthmus of the tube will not take the No. 2 Yankauer Eustachian bougie, electrolysis should be used.

Dilatation of the Eustachian tube with bougies is just as rational as the use of bougies in the urethra—and furthermore, the indication for such procedure is identical—contraction of a tube by fibrous tissue resulting from inflammation with ulceration and the subsequent healing process. In cases of collapse of the mouth of the tube it is found that incision with the salpingotome, curettage of the fossa, with subsequent frequent passage of the bougies produces good results. The writer believes that collapse of the mouth of the Eustachian tube is frequently due to the use of the Politzer method of inflation, especially when performed by the patient at home. The writer never employs the Politzer method, experience having convinced him that inflation with the Eustachian catheter is far more scientific and productive of far more satisfactory results, and never prescribes the use of Politzeration by the patient at home.

Closure of the mouth of the Eustachian tube by a firm ring of fibrous tissue is in many instances the sequel of ulceration with resultant healing and contraction, to be relieved by incision and bougieing.

The writer has come to believe since the introduction of Holmes' nasopharyngoscope, that formerly the Eustachian catheter was not in the mouth of the tube and that in consequence the middle ear was not properly inflated, when we thought it was. This simply means that any procedure is better performed in the light, under the eye, than in the dark by touch.

Given a series of cases of ordinary, or greater, degree of deafness, or associated with tinnitus, what does examination of these cases show as to the prognosis for the restoration of hearing? Can we make a prognosis of any degree of reliability in such cases without first treating the Eustachian tubes? Prognosis ought not to be made until the tubes are opened. Our hearing tests applied for the purpose of ascertaining the condition of the hearing apparatus proper, or internal ear, are much modified by closure of the Eustachian tubes. Cases come to us in which definite prognoses by good men have been made which were entirely at variance with the possibilities of relief or cure, as proved by the outcome of treatment. For instance, Mr. J. B. K., age 76, came for treatment January 10, 1914.

He had received his last treatment in New York in September for a condition which had developed in the preceding month. His complaint was loss of hearing. A diagnosis of chronic catarrhal otitis media had been made and a poor prognosis had been given, with the information that only occasional inflation was demanded. Examination showed the following: *Weber,* to the left. *Rinne,* positive. *Schwabach* with C^2, right, bone conduction, 23 seconds; air conduction, 33 seconds; left, bone conduction, 20 seconds; air conduction, 30 seconds; C^4, C^3, C^2, louder by air conduction; C^4, louder by bone conduction. Dench fork positive, right and left, more faintly to right. *Whistle,* whole gamut. *Acoumeter,* left, 6 feet; right, 12 feet plus. *Watch,* right, 6 inches; left, 48 inches. External canals are almost occluded by exostoses. Both Eustachian tubes are obstructed by boggy closure, taking No. 3 sound, however. Tinnitus had been a prominent symptom.

Treatment of the tubes comprised applications with Yankauer applicator, bougieing, electrolysis, inflation of middle ears, high frequency current until both tubes took No. 5 bougie and both isthmi took No. 3.

This patient is almost totally blind, so he was much disturbed at the prospect of losing his hearing. Because he was 75 years of age, it was not necessary to make a bad prognosis. It did not require a long course of treatment so that hearing of the conversational voice was brought up to the standard. March 29, 1915, a year later, the right ear was found to be losing bone conduction for C^4, C^3 and C^2 forks. These were transmitted to the left side. Weber was still to left. Hearing still highly serviceable.

The writer believes it possible to find the cause of Eustachian obstruction outside the ears in a large percentage of cases. Fallacious rules for guidance have prevailed in the past because the conditions discovered at the first examination were due to a combination of influences—Eustachian obstruction, infection by lymphatics or blood vessels, reflexes or infection from the teeth, tonsils or adenoids, or some abnormal systemic condition.

Before we pronounce any case incurably deaf it behooves us to search carefully for neighboring or general causes, and to put the Eustachian tubes in normal condition, because a remnant of hearing which is practically valuable for daily intercourse with one's fellow man can be nullified by closure of the Eustachian tube or by disease in neighboring organs. In some cases, although the existing deafness is originally due to Eustachian disease, opening the tubes

does not improve the hearing because the condition has existed too long. In such cases we can improve the results of our tests and still the patient will not hear because he is subjectively deaf, or is incapable of giving due attention or interest. A certain percentage of cases of Eustachian obstruction are easily relieved. Eustachian obstruction proves rebellious to treatment because disease of neighboring structures such as the teeth, tonsils, or adenoids affects the tubes, either directly by continuity of tissue, or reflexly. The percentage of cases ultimately found not to be amenable to improvement will be small, provided we search carefully for the cause and remove it.

To tell a patient that he will need inflation of the tubes once a month or so for the rest of his life, and that such treatment will be beneficial, is to confess, in many instances, that one is unable to find the true cause of the trouble or to carry out a line of treatment that would bring about a cure or more immediate relief.

Fibrous narrowing of the Eustachian isthmi is the result of ulceration of the mucous membrane lining the tube, with resultant healing and contraction.

The writer's observation convinces him that many general practitioners undertake, through cupidity, to treat cases which ought to be referred to the specialist.

We cannot isolate our specialty. In all our work the patient's general condition must be kept in mind. The general practitioner cannot afford to forget that there are those who have given special study to their particular branches of medicine and surgery. A splendid example is the gastroenterologist who eliminates the conditions included under the head of his specialty and then refers his patient for examination of the eyes and ears in the search for the cause of vertigo, nausea, vomiting, headche, etc.

Is sufficient weight placed upon the general effects of Eustachian obstruction? One woman in this list of cases, who had suffered from tinnitus for 25 years became insane. Her age was 48. She was born in Russia and had been in this country 25 years. At one time before coming to this country she had a fall which fractured her left jaw, and, I believe, damaged her left labyrinth, for she had pronounced tinnitus the day following the fall. Her general health has always been good. Had been treated at Königsberg, had a mastoid operation 12 years ago in Boston; three years later, or nine years ago, had another mastoid operation. Had also been treated in many dispensaries and had been told that nothing more could be done for her.

Examination showed the drums to be retracted and transparent. The Eustachians to the isthmi were patulous, but the isthmi themselves were very narrow. There were adhesions across the left fossa of Rosenmueller. Weber to left. Schwabach with C^2 fork, right, air conduction, 8 seconds; bone conduction, 18 seconds; left, air conduction, 8 seconds; bone conduction, 12 seconds. Rinne, with 2048, air conduction greater than bone conduction, right and left (bone conduction reduced in left); with 1024, bone conduction greater than air conduction, right; air conduction greater in left; with 512, bone conduction greater than air conduction, right; air conduction greater in left; with 256, bone conduction positive; air conduction negative, right and left; with 128, bone conduction positive; air conduction negative, right and left.

This test shows the left ear to be slightly the better, and this is the ear in which the tinnitus was so annoying, and which was damaged by the fall.

Dench fork, negative, right and left. Whistle, right ear from 2 down; left, from 4½ down. Acoumeter, 2 inches, right and left. Blood pressure, 110.

The adhesions in Rosenmueller's fossa were broken with the finger. Both Eustachian isthmi were opened with electrolysis. After three days the tinnitus was absent almost half the day. It was better by day, worse by night.

This woman's only complaint was of tinnitus. Opening of the Eustachian tubes produced at least temporary improvement, even in this desperate case, but the woman was soon pronounced insane. This again shows to what extremity the constant hammering on nerves can bring a patient. I believe the woman was driven insane by head noises. I also believe that something could have been done to relieve her, even if that something went to the extreme of destroying the labyrinth.

In the diagnosis of these cases all aids were sought, including laboratory tests, radiograms, etc.

Suite 1120 Brockman Building.

BILATERAL POLYPOID HEMANGIOMA OF NASAL SEPTUM.*

Dr. James G. Callison, New York City.

Before presenting the patient, I wish to say just a word as to the nature of the hemangiomata. Brooks, in his "General Special Pathology," gives probably the clearest description. They are divided into two general classes, angioma cavernosum and simplex. Cavernous angioma consists of numerous large, intimately connected blood spaces which occupy the position of the capillaries and merge into wide, tortuous and frequently sacculated veins. The size and form of the spaces is very variable. They are lined with delicate endothelium, and consists of a basement structure composed of ordinary connective tissue. In this are sometimes found also elastic fibres and smooth muscle. The tumors are of greater or less density according to the amount of this tissue present.

Angioma simplex (teleangiectasis) consists of wide, partly newly-formed capillaries, the walls of which are altered. The arteries and veins also may be involved, though the alteration of the capillaries predominates. Ordinarily it does not appear in tumor form, but as a diffuse, flat growth. This is the ordinary "port-wine" birth mark. The two forms are both usually congenital, and merge into each other without any sharp dividing line, while the cavernous angioma merges into the so-called erectile tissue.

In addition to these forms of true angioma, text-books on nose and throat diseases speak of the "bleeding septal polyp," springing from Kiesselbach's area, just below the center of the triangular cartilage of the septum. In these the numerous blood vessels, lined with simple endothelium and showing no muscular coat and but little adventitia proper, are small and lie in a stroma of very lowly organized connective tissue containing large numbers of lecocytes, including many lymphocytes, endothelioid and plasma cells. These seem to be a type of abortive granulation tissue or varix.

The tumor in the patient I wish to present is, as the microscopical description below and the accompanying microphotographs demonstrate, more closely allied to the group of

*Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, May 24, 1916.

angioma cavernosum. This, in its turn, is only slightly removed from erectile tissue, into which it imperceptibly fades.

The patient, Mrs. S. P., Russian, married, is the mother of two children, 2½ and 4 years old respectively; no miscarriages. She was first seen at the clinic of the Manhattan Eye, Ear and Throat Hospital on May 6, 1916, complaining of crusting in her nose and severe frontal headache, unrelieved by glasses, from which she has suffered for the past five years or more. As she

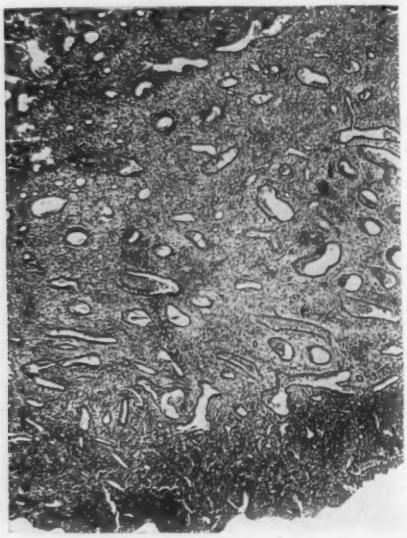


Figure 1. Longitudinal section of one of the polypoid excrescences showing numerous blood vessels, base of attachment and purulent infiltration near surface. Magnified 30 diameters.

is a Russian Jewess and speaks little English the history was difficult to get and unreliable. On examination there was pus on the floor of the nose, in the middle meatus, and a slight flow of pus falling over the middle turbinate. That in the middle meatus was scant, dry and crusted. All the internal nasal structures presented the advanced grade of trophy characteristic of chronic sinus infection.

On both sides of the septum, at the junction of the crest of the vomer and the triangular cartilage, were a number of excrescences ranging in size from a pea down. These were pe-

dunculated, smooth, dark red in color and bled on the slightest touch. So far as these growths were concerned the history was negative.

Transillumination showed all the sinuses that could be reached free from shadows. The x-ray shows a thick membrane in the frontals and ethmoids, and granulations or pus in the left antrum. The Wassermann reaction was negative.

Some of the polypoid excrescences anteriorly on the right side were removed for microscopic examination with surprisingly little

Figure 2. Same magnified 160 diameters.

bleeding. Sections of this show a tissue containing large blood spaces with incompletely developed walls. These spaces are lined with a single layer of indefinite endothelium, and many of them have what appears to be smooth muscle and a poorly developed adventitia. In the central part of the nodes the intervascular space is filled with edematous areolar tissue with few cellular elements. Nearer the surface, where the epithelial covering is bathed with pus and there is a slow but continuous absorption of toxic material

there is a dense infiltration with leucocytes, among which are many lymphoid, endothelioid and plasma cells. This condition is so advanced in places that it approaches in appearance granulation tissue. The epithelium is everywhere intact, as is the basement membrane, although the latter is much thinned.

Diagnosis: Bilateral hemangioma of nasal septum, frontal sinusitis and ethmoiditis on the right, pan sinusitis on the left.

As to the treatment, the bilateral appearance of these polypoid growths is, in my opinion, evidence of their origin in the joint between the crest of the vomer and the triangular cartilage. To effect a cure it would seem to be necessary to obliterate this joint by a submucous resection. However, while caring for the surgically more important sinus infection, I shall probably try the cautery experimentally.

Before closing, I wish to answer one point of the discussion before it arises. That is as to the effect of the irritation of the sinus infection on the hemangioma. I believe that practically all hemangiomata are laid down during the embryological development of the body. There may be and probably is some further development during later life. They are essentially, however, congenital affairs. This view is strongly supported by the histological development of the present tumor. The central, norphologically older part of the polypoid mass is entirely free from evidence of irritation, and has blood spaces with some attempt at the formation of walls. Toward the surface, where chemical irritants may be absorbed, there is every evidence of secondary reaction.

206 East Seventeenth Street.

Importance of Bacillus Carriers in the Propagation of Diphtheria.

G. F. RUEDIGER, *Illinois Med. Jour.*, Oct., 1916.

The author concludes that bacillus carriers who have been recently exposed to diphtheria frequently transmit an infection to others which gives rise to clinical diphtheria although the carrier may never show any clinical symptoms of the disease. These temporary carriers are of greatest importance in keeping up an epidemic. Nose and throat cultures should be taken from every "contact" and all those who give a positive culture should be isolated.

P. F.

PRIMARY EPITHELIOMA OF THE FRONTAL SINUS. REPORT OF TWO CASES.*

Dr. D. S. Dougherty, New York City.

Malignant disease of the accessory sinuses is not of frequent occurrence, and when present is usually the result of an invading process of extrinsic origin. Owing to its situation and anatomical relations, the frontal sinus is even less apt to be the seat of new growths than are others. The following cases of primary epithelioma of the frontal sinus are therefore of especial interest and are particularly worthy of recording.

Case 1: P. S., male, age 48, born in Italy, was admitted to the City Hospital, February 6, 1914, with the following history: For about a year he had had severe frontal headaches, pain in the right eye, and photophobia. Two weeks prior to admission, he had been operated upon in the surgical service of a general hospital, but had obtained no relief. He still suffered from the headache and pain in the eye, and had occasional spells of dizziness. The operative wound in the forehead had never entirely healed.

Inspection showed a fairly well nourished man of good physique but poor mentality, understanding but little English; face drawn and anxious in expression, with some bulging of right eye. Above the right eye was a horizontal scar, starting just over the outer canthus of the eye and meeting in the median line, and a perpendicular one extending from the hair to the root of the nose. At this intervention, was a suppurative fistulous opening, and there was another one directly over the arch of the brow. The discharge, a thin, ichorous pus, had slightly excoriated the surrounding epithelium.

Physical Examination: Heart, lungs, and kidneys, negative. Eye ground, negative; pupils equal and prompt in reaction. No subjective symptoms other than the headache and pain.

It was found to be impossible to wash out the sinus through the openings, and on inserting a probe it seemed to meet some soft, resisting body.

On February 14, the sinus was opened under general anesthesia. In place of the usual incision, the lines of the old ones were fol-

*Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, May 24, 1916.

lowed, except that the perpendicular one was made much shorter. On retracting the flap, a small circular opening in the external plate was seen. This was enlarged and the wall was wholly removed. The cavity of the sinus was found to be filled with a dark, granulomatous mass which was removed with the curette and sent to the laboratory. The inferior and posterior walls were necrotic; the posterior being entirely eroded, with considerable exposure of the dura.

The necrosed bone was removed, the cavity carefully but thoroughly curetted, washed out, and packed with iodoform gauze. Open drainage was established, it being deemed unwise to occasion further trauma by draining intranasally.

There were no post-operative complications; the headache, pain, and vertigo disappeared, and the patient was about the ward for several weeks, apparently making an uneventful recovery, when without any preliminary symptoms, he became unconscious and died in twenty-four hours. There had been no temperature changes except post-operative and just before death.

Report of tissue removed at operation: Epithelioma. Scrapings from skin, negative.

Autopsy report: Purulent meningitis.

Case 2: A. S., male, age 50, Russian, was admitted to the hospital January 8, 1916. The patient gave a history of having suffered from headache and vertigo for several months, and having been operated upon three months previously for frontal sinusitis. Since the operation the headache and vertigo had continued, accompanied by severe pain over the right eye. Had also had a continuous discharge of pus from the wound.

Physical examination was practically negative; eyes, normal; temperature, 98.4; pulse, 96. The patient was well developed and seemingly not acutely ill.

Inspection of the operative area, showed a partially healed Killian incision with fistulous openings at the center and inner angle, copiously discharging a thick, foul-smelling pus. The edges of these were ulcerated and where the discharge had excoriated the fold of the upper eyelid was a small mass of granulations.

The ulcer on the upper lid was excised, and microscopic examination revealed epithelioma.

On February 14, under general anesthesia, the wound was reopened and the sinus was found to be filled with a partly disintegrated mass which extended into and filled the right frontal lobe. This was removed and the cavities were carefully curetted, cleaned

with a weak permanganate solution, and loosely packed with iodoform gauze. The wound was left partly open. On February 16, the gauze was removed, and as some slight discharge remained, the wound was gently irrigated and a cigarette drain inserted.

The pathologist reported that the tissue removed at the time of operation was squamous celled epithelioma.

The patient was at no time confined to his bed, and complained of no discomfort. There was no impairment of the intellect, no dullness or apathy,—the only apparent unfavorable feature of the case being a rather rapid extension of the ulcerative process on the eyelid to the adjacent tissues.

About March 1, symptoms denoting possible extension into the anterior central convolution began to develop. It was first noticed that he had some difficulty in his walk and in the finer movements of his hands. Two days later, March 3, he was seized with a convulsion especially marked by severe spasmodic twitching of the left side. This was followed by total paralysis of that side and by coma lasting five hours. He then in some degree regained consciousness, noticing his surroundings and taking nourishment when offered, but unable to speak, write, or hear spoken words. The left paralysis continued, but the right side was not affected. This condition continued for three days, death occurring on March 7.

During the convulsive and comatose stages the temperature fluctuated in sharp curves from 97 to 102, the pulse rate ranging from 96 to 100.

The autopsy findings confirmed the operative and pathological;—Epithelioma of the frontal lobe with extension of the degenerative process. The ulceration was so extensive as to preclude exactness in location and prevent preservation of the specimen.

77 West Fiftieth Street.

Hay-Fever; Its Cause and Prevention. Wm. Scheppegrell, *Jour. A. M. A.*, March 4, 1916.

The susceptibility of persons to the presence of cats, horses and other animals should be distinguished from true pollinosis. Many of these cases are psychic in character but when actual reaction takes place it is probably due to some skin emanations. The general results of treatment of hay-fever so far have not been satisfactory and the author is skeptical as to the value of pollantin and other vaccine and immunizing methods. P. F.

HEMIPLEGIA FOLLOWING TONSILLECTOMY.*

Dr. G. F. Gracey, Plainfield, N. J.

This case occurred in the New York Eye and Ear Infirmary in the service of Dr. Kenefick. The patient was a Polish boy, nineteen years of age, employed as a porter in the institution. Particular effort was made to elicit a history of epileptic seizures or convulsions in early life, but nothing was found in the previous history that had any bearing on the course of the case. For at least two months he had been complaining of indefinite pains, of sore throat, headache, and particularly of constipation, and had been treated by Dr. Dixon, receiving the same attention as the other hospial help while doing his usual work. He was never confined to bed, so that these symptoms, while they may be important, were not severe enough to give him any great inconvenience. They usually disappeared after a brisk cathartic. Finally, about February 1, he came to Dr. Dixon complaining of sore throat and hoarseness and was referred to the house surgeon for more extended examination. Examination of the nose and accessory sinuses was practically negative, but there was present a chronic granular pharyngitis, enlarged tonsils of the follicular type, crypts filled with cheesy exudate, and a subacute laryngitis. There was no lymphatic involvement and so far as ascertained, no acute process was present. The patient was placed on mild treatment for the throat, and it was recommended that the tonsils be removed at a later date, on the basis that they were the exciting factors. Permission was obtained from the superintendent, and the patient was admitted to the ward in Dr. Kenefick's service.

Urine examination was negative. Physical examination was negative except for an indefinite soft systolic murmur at the cardiac apex, not transmitted and not variable. There was apparently no contra-indication to operation. Temperature, 97; pulse, 80; respiration, 20.

On February 4, the tonsils were removed under gas-ether anesthesia, the dissection method being employed. The tonsils were large and adherent in places. The only incident during the operation was that at one time the patient came out from under the influence of the anesthetic and coughed considerably. This delayed the operation time slightly until he was well under again, and caused more, though not excessive, hemorrhage than ordinarily.

*Read by invitation before the New York Academy of Medicine, Section on Laryngology and Rhinology, May 24, 1916.

Perhaps not more than fifteen minutes in all were consumed in the actual operation, and the patient left the table in good condition. In the ward about half an hour after the operation, there was considerable venous bleeding from the right tonsillar fossa, but this was easily controlled by one of the resident staff, who employed pressure in the fossa with a sponge saturated with adrenalin and bismuth subnitrate. The next morning there was no bleeding; temperature, 99.8; pulse, 92; respiration, 20. The patient spent a comfortable day.

During the next day (February 6) he complained of headache. This was attributed to constipation, and the patient was given a saline. The next morning the headache had disappeared, and the patient took it upon himself, very lightly clad, to go up on the roof garden in a cold wind, and, as afterwards developed, he was also indiscrete in his diet. That night at 11:30 he had a chill accompanied by pain in the region of the right frontal sinus. The temperature during the chill was 105 degrees.

Nasal examination on the morning of February 8 showed a rather large right middle turbinate with a slight mucous discharge from the middle fossa. During that day he had two chills, about four hours apart, lasting ten minutes each. The temperature in the latter chill reached 106.2°. Nasal treatment was continued, and the next morning (February 9), the fifth day after the operation, he seemed much better (temperature, 100.6°), until in the afternoon, when he became restless. The temperature went up to 105°, and he had a convulsion at about 8 o'clock at night.

The next day (February 10), it was noticed that the left side, particularly the arm, was weak, and to a lesser degree, the leg. Blood count showed 15,600 leucocytes, with practically a normal differential count. Blood culture taken the same day was negative at twenty-two hours and at seventy-two hours. The throat culture was negative to Klebs-Loeffler bacillus. Lungs negative; cardiac murmur about the same as before operation.

On February 11, seven days after the operation, he was restless in the morning but became stupid in the afternoon. The nasal condition had completely cleared up; but a left-sided paralysis had fully developed. The reflexes were not as marked as compared with the sound side, but there was some spasticity; no Koenig or Babinski signs. Disturbances of sensation were present. He could move the toes of the left foot and raise the left leg slightly, but the rest of the left side was powerless. Dr. Ramsey Hunt made a hurried examination, and diagnosed cerebral embolism. Lumbar

puncture showed 181 cells per c. mm. Globulins, plus; Fehlings, plus; culture, negative. Both the blood and the spinal fluid gave a negative Wassermann.

During the next two days his condition became increasingly worse. He had severe headache, was restless and delirious at times, and the neck became stiff. The eyegrounds were negative. A second spinal puncture showed 111 cells per c. mm.; otherwise the same as on the previous examination.

On February 9, one or two convulsions were recorded, beginning with a twitching and sucking of the lips; then the left eye, then the muscles of the face became involved, the seizure extending to the left side of the body, the left arm being held rigid during the convulsion; afterwards it was paralyzed.

The next day there were five convulsions, each lasting ten to thirty-five minutes. Sometimes only the face was affected and at other times the whole body. The temperature was between 102 and 103 degrees. The stiffness of the neck continued, and during the next day (February 14) the condition passed from semi-consciousness to coma, with slight convulsions. The breathing became of the Cheyne-Stokes type, and death occurred at noon, the tenth day after the tonsillectomy. It was not possible to obtain a postmortem.

In the absence of a postmortem only a probable diagnosis can be made. The question arises whether the indefinite complaints for weeks preceding the tonsillectomy were the prodromal symptoms of a meningitis which the operation precipitated. Then again the hemorrhage and cough during the operation and the hemorrhage later might have been the source of an embolus. Finally, the exposure on the third day, with the subsequent frontal, and perhaps sphenoidal, sinus inflammation may have been the source of an infection through some open venous pathway.

The finding of a negative spinal fluid culture on two occasions by reliable workers would seem to rule out the presence of a general meningitis. An extremely probable diagnosis seems to be an embolism in the motor area, septic or non-septic in type, probably the former, sufficient to produce a left hemiplegia, causing irritation in the motor area, as shown by the Jacksonian type of convulsions, and causing an adjacent localized meningitis sufficient to raise the cells in the spinal fluid without producing a general meningitis due to any discoverable organism.

604 Park Avenue.

A CASE OF SEPTICEMIA WITH POLYARTHRITIS AND PULMONARY INFARCT FOLLOWING TONSILLECTOMY.*

DR. WILLIAM A. SCRUTON, New York City.

The subject was a maid about twenty-eight years of age. She stated that notwithstanding an appearance of one suffering with an anemic condition, her general health had always been satisfactory, save for attacks of tonsillitis with rheumatic pains in various joints when wintering in the North.

On a date, not exactly fixed in my record, but which was late in January, 1915, Miss A. came under my direction complaining of stuffy sensation and pain in her left ear. She had just been through one of her attacks of tonsillitis.

Examination of the tympanic membrane showed the usual evidence of an O. M. A. C.; post-nasal examination with the mirror revealed a small flat adenoid growth and some mucus clinging to the Eustachian cushions on either side; the tonsils were hypertrophied and contained an unusual multiplicity of crypts. The left ear showed moderate impairment of hearing for whispered numbers. No other hearing tests were made.

Cleansing of the tonsils and the nasopharyngeal tract was undertaken and a gentle inflation of the left eustachian tube given; response was entirely satisfactory. On Feb. 5, the symptoms had subsided; however, on inspection of the tympanic membrane a slight injection of the vessels at the circumference and along the handle of the malleous was noted as persisting and inflation demonstrated some moisture in the tube. Having on previous occasions, in similar cases, cleared up this terminal condition by means of applications of freshly prepared twenty per cent argyrol solution with the Yankauer cotton wound wire, which was inserted well into the isthmus of the Eustachian tube, I determined to institute this procedure in this case. When Miss A. returned the next day, it was learned that pain had developed a few hours after the Eustachian application was made. The pain grew progressively worse, reaching the degree of agony during the night. Examination at this time showed a congested bulging tympanic membrane with tenderness present over the region of the mastoid antrum. Admission to the hospital ward was obtained and myringotomy performed under gas. No pus was demonstrated at the time of myringotomy but a culture of blood which welled up from the incision showed a pure culture of streptococcus hemolyticus. The O. M. P. A. responded kindly to hot irrigation treatment. The tympanum was pronounced

*Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, March 22, 1916.

normal within ten days and did not again become a factor in the case. To this period, the temperature had not at any registration been above 100.2.

Upon request of the patient, and the occasion seeming propitious, I performed a tonsillectomy February 16, by means of the Mosely snare under general anesthesia. The operation was cleanly done and the throat at no time thereafter approached the usual amount of soreness generally expected. In the light of what follows, this is an important point to bear in mind.

In the subsequent development of this report time will be reckoned from the date of the tonsillectomy as the first day, thereby simplifying the chronological presentation of the leading facts and data.

The first, second and third days were passed in fair comfort; the temperature remaining between 100 and 101. On the fourth day the temperature reached 102 and there was complaint of severe pain in the back. From this day on to the fourteenth day the plotted temperature registrations traced a typical picture of low grade sepsis. On the fifteenth and sixteenth days there were sharp rises of temperature in the afternoon to 103.8 A lysis was then established which continued down to the twenty-second day when there was another sharp rise in temperature to about 103, followed by a lysis which brought the plotted curve back to approximately flat on the twenty-sixth day.

Throughout the period just mentioned, various joints became very painful, not bearing pressure or movement, but there was no redness or noticeable swelling; numerous blood counts averaged the total leucocytes at 14,000, the polynuclear nutrophiles at 75 per cent, the erythrocyte counts and the hemoglobin estimations showed the presence of a marked secondary anemia. Urin analysis showed a small amount of albumin, hyalin and granular casts were present.

Blood cultures were taken as follows:

Fourteenth day, negative after 48 hours.

Twenty-sixth day, streptococcus hemolyticus, 36 colonies per C. C.

Thirty-eighth day, streptococcus hemolyticus, one colony per two C. C.

On the sixteenth day, Dr. Hutton reported subcrepitant rales over the right lower lobe of the lung. His previous examinations of the chest had been negative save for some hemic heart murmurs. At this time the patient began to complain of pain in the right side of the chest and coughed frequently throwing off considerable quantities of brown streaked tenacious mucus. The chest examination on the 17th day revealed dullness over the lower portion of the right

lower lobe; increased fremetis; diminished breath sounds and voice; loud subcrepitant rales only on coughing or deep inspiration. A diagnosis of pulmonary infarct was made and verified by the subsequent progress of the chest condition.

While still weak the patient was transferred to St. Luke's Hospital in an ambulance, for the purpose of receiving the benefit of outdoor treatment which we were not equipped to carry out. She was discharged cured in two weeks. It should have been stated that the transfer was made on the fifty-first day.

Conclusion: Having developed an O. M. P. A. as a result of instrumentation through an apparently clean field in which there lurked the streptococcus hemolyticus, it would seem to be poor judgment to proceed with tonsillectomy in so short a lapse of time, without first taking cultures of the throat, and especially the tonsil crypts. Cases such as the one I am reporting probably never would occur if preliminary culture and cleansing of the tonsil crypts with suction and antiseptic applications could be instituted for a short period of time preceding operation; however, it is impracticable in most instances in private practice and invariably so in public practice.

I note that the great majority of streptococcus hemolyticus septicemias with which I have been in personal contact during the early stages, have developed painful joints with no redness and little or no swelling and a temperature curve not at all suggestive. Many of the low grade type do not get beyond the polyarthritis stage and are then considered cases of subacute articular rheumatism. A peculiar feature is that in all of the cases, no matter how high or low the degree of infection, the joint symptoms respond to the following antirheumatic treatment: aspirin grs. 5, natron bicarb. grs. 10 q. 4 h.; application, with gentle friction, of oleum gaultheria and oleum dulcis 1:4 followed by binding lightly in large pads of cotton. I am quite certain that most of my colleagues have knowledge of cases in which tonsillectomy was performed on account of a rheumatic history, and seemed to precipitate an acute articular attack. These are, I believe, cases of septicemia; the last flash from the cryptic foci of infection causing the symptomatic condition known to the profession as rheumatism.

All cases complaining of joint pains, however mild, and regardless of temperature, following operations about the throat, nose and accessory sinuses including the middle ear and mastoid process, should have blood cultures taken at as frequent daily intervals as the conditions prevailing will permit of drawing the required quantity of blood.

27 East Fifty-seventh Street.

THE DIAGNOSIS OF SEROUS LABYRINTHITIS.*

DR. H. B. GRAHAM, San Francisco.

The diagnosis of serous labyrinthitis is made on the following symptoms: Succeeding an acute or chronic middle ear suppuration, or after an operation for the same, there ensue dizziness with or without vomiting; nystagmus to the sound side; the hearing is decreased to the perception of a shout or is lost entirely, the caloric and turning reactions are present or may be lost, the fistula symptom is present. In other words, we may, with the exception of the fistula symptom, have all the signs of a diffuse suppurative labyrinthitis and be unable to make a diagnosis. The life of the patient, and certainly his future ability to hear, may depend upon the diagnosis; it. therefore, becomes very important that a clear idea of the condition be acquired in order that the emergency may be met.

In those cases where we can easily make a caloric test and find it present we have a clear path; but there are times when the placing of even sterile water in the ear after an operation is a dangerous procedure. The dura may have been lacerated or a sinus opened; there may be a fistula in the labyrinthine wall which is depending on a fibrin covering for protection, and we may not care to break down the barriers against infections of the dura or labyrinth. Here we must depend entirely upon our clinical acumen to tell us when to open the labyrinth and sacrifice the patient's prospects for future hearing in order to save his life.

There are, then, two classes of cases where we must depend upon appearances to guide us to the most successful issue, namely: those cases in which a diagnosis may not be made in spite of our functional tests (deafness and non-reactive labyrinth), and secondly, those where it is inadvisable to make these tests. In either case we wait on the clinical course for guidance.

The dizziness and nystagmus have set in and the patient is lying on the sound side or is comfortable on either side, if he is not compelled to move. As long as there is not any headache, as long as the fever ranges between 98.6° and 99.6°, the pulse remains around normal, and there is no marked variation in the blood picture, we are pretty safe in letting the patient alone. But should

*Read before the Pacific Coast Oto-Ophthalmological Society at Portland, Oregon, June 23, 1916.

the temperature and pulse rise rapidly, accompanied by a marked headache, and the dizziness take on a stormy character with vomiting, so that the patient is unwilling to be moved at all, the labyrinth must be sacrified and drainage established even as far as the internal canal.

Case 1. Mrs. M. had had a discharge from the right ear all her life. Two months previous to her first visit to me on August 23, 1915, she had had a polyp removed from the ear, and had been in bed for a couple of weeks following the removal of the polyp on account of dizziness and nausea. The dizziness and unsteady gait had remained, but in a less degree. Weber to the right. Rinne negative. Schwabach indefinite. Fistula symptom positive. Hearing poor on the right (whisper and watch nil; spoken voice at four yards).

At operation a cholesteatomatous mass was removed from the antrum and attic; there was a fistula in the horizontal canal. Following the operation the patient was nauseated, dizzy, had a nystagmus to the left, was totally deaf, and the temperature was 100°. In twelve hours the patient seemed to be somewhat more comfortable and therefore no effort was made to find out if the vestibular apparatus were intact. For the next three days the temperature remained about 99°, and the nausea and dizziness gradually subsided until on the seventh day the nystagmus and dizziness had disappeared and the patient left the hospital.

One week later the patient, tested with the noise apparatus, was apparently deaf. The wound was granulating normally. Four months later the hearing was the same as before the operation, and two months later she could hear a whisper with the noise apparatus. Recovery was uneventful save for the fact that about four months after the operation, for a period of two weeks, there was a marked tenderness over the cerebellar region, with dizziness and errors in the pointing movements.

Case 2. Mrs. de G. This patient had complained of a discharge from the right ear for ten years, intermittent headaches for one year which had become constant in the last two months, and dizziness for two months. The Weber was to the right. Rinne negative. Schwabach slightly short. Hearing for spoken words was one yard, for whisper one-half yard, and with an air noise in left ear she could hear spoken words one foot. The caloric was prompt. Fistula symptom absent. There was a perforation in the attic wall and a slough filling the opening.

At the operation the dura of the posterior and middle fossa was uncovered for small areas. The horizontal canal eminence was intact and the stapes region normal.

After the operation there was a pronounced nystagmus to the right, that is, toward the operated ear, for five days. Patient was deaf on this side. Temperature from 99° to 100°. No vomiting. Slight headache. Twenty-four hours after the operation the bandages were saturated with serum, and the packing of iodoform gauze was removed on the third day under the supposition that the iodoform might be producing an irritation. The cavity of the middle ear would fill with fluid as fast as it could be mopped out; this lasted for a week or ten days and at no time could I ascertain where it was coming from. I assume that it was cerebrospinal fluid. Rigid asepsis was observed and no attempt made to find out if the vestibular apparatus were intact, therefore a positive diagnosis could not be made.

One month later the patient was apparently deaf in the right ear and was dizzy at times for short periods. Two months after the operation there was no dizziness; the patient heard spoken words at room distance and a whisper at three yards, with a noise apparatus she heard spoken words at one yard.

I assume that there was a serous labyrinthitis in this case, although the path of infection I am not prepared to give, neither can I explain why the nystagmus was persistently toward the operated ear. That I was justified in making no attempt to reach an accurate diagnosis is amply shown by the result obtained. Cases like this do arise, when we must stand ready to operate upon the labyrinth should the symptoms increase instead of decrease; but caution should certainly be used in our investigation lest we remove our barriers and turn a harmless case into a suppurative labyrinthitis or meningitis.

200 Post Street.

NASAL REFRACTURE.

Dr. L. L. Stanley, San Quentin, Cal.

In almost any fistic encounter the nose is the most accessible point of attack, and as a result it may be injured to greater or less degree according to the force of the impact. In some cases the blow is not sufficient to fracture the nasal process of the superior maxilla or the nasal bones, but there is force enough to dislocate, distort and bend the cartilage of the septum, the vomer and eth-

Fig. 1.

Fig. 1a.

moid so that there will result a permanent nasal obstruction.

In other cases the bones are broken and the nose is deformed, the bridge being turned either to the right or left. If this condition is soon recognized after the accident and the fracture is reduced, there may be no permanent deformity; but without attention the result will be disfiguring.

An examination of the prisoners sent to the California State Prison at San Quentin reveals the fact that 14.5 per cent have deflected septa, and 5.8 per cent have noses which, on account of some injury, are not straight, but inclined to one side. Some have a combination of both conditions.

The submucous resection is a valuable procedure for the deflected septum, and usually good breathing space is provided by

this means. There are several methods described for straightening the nose to produce good cosmetic results, but for the most part these operations are long, painful, tedious, and in some cases deforming and not altogether satisfactory.

Not having had good results with the ordinary methods for straightening noses, another plan was devised. It is believed that to refracture a nose, very little more force is required than that which is used in the first place to produce the original break, and if this force is applied at the right place less force is required, and less damage will be done to the structures involved. The method of procedure is as follows:

Fig. 2.

Fig. 2a.

After preliminary preparation, the patient is placed on the operating table and given a very quick ether anesthetic. As soon as the patient is relaxed, the operator places against the convex side of the nose, a round piece of wood, or buffer, six inches long and one inch in diameter. The end placed against the nose is heavily padded.

Then with several strokes of a mallet against this buffer, each stroke being progressively heavier, the nose is refractured and is quickly set in proper position. There is usually some ecchymosis following very soon, but by holding the nose firmly with the thumb and finger, undue swelling is prevented.

As soon as the nose is in proper position, the nasal cavity is quickly packed with strips of narrow bandages, previously boiled in petrolatum. This is packed in rather tightly, and soon the bleeding from the nose is stopped.

By this time the patient will have emerged from the anesthetic, and will be able to co-operate by expectorating any blood which may have run down his throat.

When the internasal packing is in, pieces of gauze, cut to fit over the nose, onto the cheeks, and up to the forehead, are saturated with liquid collodion. These pieces are then placed over the

Fig. 3.

Fig. 3a.

nose in succeeding layers, each one being allowed to harden by means of a current of air which evaporates the ether. In a short time the splint is dry and the nose is held in normal position. On the second day the internasal packing is removed, and on the fourth or fifth day the collodion gauze splint is taken off.

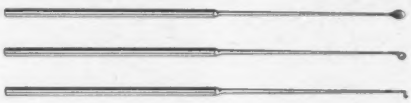
The nose is usually found to be straight and able to functionate better than before. It may be necessary to do a submucous resection subsequently. There is usually a "black eye" which persists for several days. The results have been satisfactory.

AN IMPROVED AURAL CURETTE.

Dr. J. A. Hagemann, Pittsburgh, Pa.

The "ear-scoops" supplied in the ordinary aural instrument cases are practically identical with those contained in the old Gross pocket case. Anyone who has attempted to use one of them through the lumen of an aural speculum is in position to appreciate the advantages of the herewith illustrated instrument, which can be utilized either as an aural spoon or for curettage. The angle at which the spoon is set lends great advantage.

The usual aural hook is simply a slender rod bent at a right angle near the extremity. This one has the short bent portion curved falciform, in manner to correspond with an arc of the external auditory canal. Where a bean or similar globular object obturates the canal, one may, by employing a lubricant, and closely hugging the meatal wall, slip the hook past the foreign body, and then, by



giving the instrument a quarter turn, place the curved angular tip in such position that its withdrawal will bring out the intruder. The advantage of the curved over the straight hook is twofold; it permits a longer hook and can be inserted with less probability of causing trauma.

That the prick of a pin is more startling than an accidental cut from a sharp edge of a piece of broken glass is familiar. The application of this axiom suggested the devising of a tympanum perforator having a keen-edged distal end. Even when a local anesthetic is employed the incision with the sharp pointed bistoury is often lancinating. The glide obtainable with this knife implies an advantageously longer incision, a feat which cannot be unerringly accomplished with the time-honored instrument, because the patient gives the usual start as soon as the point touches the membrane.

All three instruments have identical, long, slender shanks, which permit the hand being kept out of the line of vision, afford ample leverage and grant the best conditions for graceful manipulation. They were made for the writer by Feick Brothers Co., of this city.

Highland Building.

THE RESPONSIBILITY AND NON-SUCCESS IN NASO-PHARYNGEAL SURGERY.*

DR. JAMES E. REEDER, Sioux City, Iowa.

No doubt but what you all have had this statement put before you: "Doctor, my child was operated upon about six months ago for the removal of his adenoids and tonsils, but we have failed to see any benefit from it. We were informed that he would discontinue to breathe through his mouth and his hearing would be much improved. What have you to say about it?"

Concisely—you have failed to make a thorough examination, or the patient has been operated upon by one who is not versed in rhinology as he should be. For, as you know, these little patients frequently have a marked hypertrophic rhinitis and should receive, if possible, both before and after operation, a course in treatment of the iodin-potassium iodid glycerin solutions or at the time of operation one of the several submucous operations to shrink down the erectile tissue of the inferior turbinate, without sacrificing any of the mucosa.

You hear of just such results as I have related much more frequent now than two or three years ago. What does it mean? It means that an operation which has far-reaching benefits when indicated and properly carried out, is being rapidly placed in disrepute with the laity.

And it is all due to the fact that there is not enough stress applied to the importance of our operations. Why such a state of affairs exists it is hard to understand, unless through fear the surgeon may lose his patient, he tries to impress him it is a small thing and very little danger connected with it. This is a gross mistake, for it prompts inferior and less qualified men to do this work, which frequently ends disastrously.

How easy it appears of performance to see a successful cataract extraction, but the following seven days is often more trying and the brilliancy of the operation shorn of results by improper after care.

Just how urgent the removal of an hypertrophy or the correction of a deflected septum should be, I think our conscience is called in to play an important role.

*Read before the Northwestern Ophthalmological, Laryngological, Rhinological and Otological Society, at Omaha, Neb., June 8, 1916.

It is not always the question of an immediate improvement or benefit a patient is looking forward to, but how much harm is going to result if immediate attention is not given.

You have all had cases where you insisted it was dangerous to life not to have immediate attention, but your patient has survived to continuously remind you of your error.

I had a distressing experience about six months ago. I was called to do a parencentesis in an acute otitis. Patient seemed to be doing nicely for about two weeks, when the discharge suddenly increased. There was slight tenderness over the tip of the mastoid, which continued for about eight days. A skiagram was taken which proved positive; there was a slight drooping of the posterior superior canal wall. I advised a mastoidectomy; patient refused; the patient is in excellent health to-day, and I am anything but a gentleman.

If the removal of a tonsil is such an easy matter, why do we see so many bad results? I am sure there is not a member of this society that will not agree with me that a tonsillectomy is a difficult procedure. Aetius, writing in the early part of the sixth century, was the first to object to the complete removal of the tonsils. Quoting in his language: "Those who extirpate the entire tonsil remove at the same time structures which are perfectly healthy and in this way also give rise to serious hemorrhage." Yet the importance attached to a proper tonsillectomy is often spoken of by the laymen and general practitioners as of little consequence and easy of performance.

But frequently we see patients who have not been benefited and often much worse than previous to the operation. A deformed palate, a dry throat, post-nasal stenosis, cicatrices, tonsil tissue buried under fibrous bands, all this we encounter following tonsillectomy.

I believe many of the bad results are due to incomplete anesthesia, which is, indeed, an important item in such a difficult and often trying operation. I believe there would be fewer deaths from hemorrhage if a nurse who has had special training along this line should always watch the patient while coming out of the anesthetic.

I do not want to be misconstrued in the foregoing as being critical, but I would like to see our specialty placed upon a much higher plane than it is, which can be done by preventing the untrained from assuming responsibilities of special work, just as the non-graduate can no longer practice general medicine.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

May 24, 1916.

DR. HENRY L. LYNAH, *Chairman.*

Osteomyelitis of the Sinuses of the Nose Complicating Scarlet Fever. DR. HENRY L. LYNAH.

(To be published in a subsequent issue of THE LARYNGOSCOPE.*)*

Case of Frontal Sinusitis with Orbital Fistula. DR. FRANCIS WHITE, for DR. HARMON SMITH.

Joseph D., a young lad, gave a history of having had grippe four months ago, preceded by a slight discharge from the nose; two days later he had a swelling in the median line. After two or three days this swelling extended down under the left eye, and shortly after that it passed to the other side and closed that eye. During that time the swelling did not vary much in size. Two weeks ago, a discharge appeared on the upper lid of the left side, and the child was admitted to the Manhattan Eye, Ear, and Throat Hospital. The x-ray showed the following: "Granulations or pus in the frontal sinus. Ethmoids clear. Thick membrane in right antrum. Peculiar-looking roughness at anterior wall of the frontal sinus, externally. Suspicious of specific condition."

The patient was put upon increasing doses of K. I., and has taken 20 drops t. i. d., and under this treatment has improved markedly. He has had no nasal treatment whatever.

Wassermann, negative.

DISCUSSION.

DR. ARD said that he had a similar case under his care at the present time. Some time ago the patient had consulted his family physician for a swelling under the right eyebrow. This was incised and a fistula remained. When Dr. Ard saw the case a probe could be passed into a cavity that was apparently the frontal sinus. An x-ray was taken and from the appearance of the plate, Dr. Dixon doubted the presence of a frontal sinus. The anterior end of the middle turbinate was removed and the nasal duct enlarged; after that the discharge lessened and on two occasions the fistula closed, only to reopen. An external operation was decided upon and the usual incision made. On cutting down over the frontal sinus a large sequestrum of bone was found and removed; the frontal sinus was present and packed with granulation. After thorough curretting the wound was sewed up except the lower angle where a small wick of gauze was placed. A free opening was found from the frontal sinus into the nose. Convalescence has been uneventful and the wound is now practically well.

Bilateral Polypoid Hemangioma of the Nasal Septum. DR. J. G. CALLISON.

(Published in the present issue of THE LARYNGOSCOPE.*)*

Correction of Nasal Deformity. DR. L. M. HURD.

The patient, a boy, was presented to show what can be accomplished by a little patience. He was first seen by Dr. Hurd in October, 1915, having had a button in his nose, followed by a loss of the lateral and other internal cartilage; two years before, he had had paraffin injected into the nose and the paraffin had become lumped up. Dr. Hurd attempted to do a rib transplantation, but the second day a haematoma developed, which became infected and filled with pus. At first Dr. Hurd thought he would try to take out the bone graft, but concluded to let it alone and treated it with bismuth paste, and persisted in this treatment until the end of February, when a sequestrum was removed. The x-ray showed a perfectly good piece of bone in place. In March, the wound was well and perfectly dry. Unfortunately, the x-ray picture had been mislaid. The boy when first seen had a perfect saddle nose, and the condition now is much better than before the operation. The bone can be felt in place, distinctly. It was altogether a matter of patience and the use of bismuth paste.

Presentation of Specimens—Naso-pharyngeal Fibroma; Epithelioma of the Tonsil; Osteo-sarcoma of the Lower Jaw. DR. L. M. HURD.

The epithelioma of the tonsil occurred in a man, aged 60 years, otherwise perfectly healthy; he had not noticed any trouble up to two months before he came under observation, when he felt some pain and interference with swallowing and breathing.

The fibroma of the naso-pharynx occurred in a boy 15 years of age. One year before there had been a removal by a physician in the West, but the condition promptly recurred, and in February he was referred to Dr. Hurd, who removed the growth by divulsion. There was very little hemorrhage. The packing was removed the next day, February 16, and on February 21 the boy went home. The growth had invaded the sphenoids and the right nares. The pressure had caused absorption of a great part of the sphenoidal walls. These growths are hard and tough, and difficult to get out. Both nares were threaded with a string, to which tampons were attached, so that if severe hemorrhage occurred they could be pulled up and used to plug the apex; but they did not have to be used for this purpose and were taken out the next day without any hemorrhage.

The patient who had the osteo-sarcoma of the lower jaw came to the Nose and Throat Hospital on September 2, with the history of having had a lower tooth removed, but that the area had not healed. The dental surgeon at the hospital had a radiograph made, and as a white area showed there, he thought that the man had a cyst of the jaw. On October 10 they curetted out what they thought was a cyst, but it continued to grow, and when Dr. Hurd saw the case in consultation there was a mass running down below the jaw as large as half an orange. The patient was seventy years old and not in very good condition, so he was operated upon under local anesthesia. He was given ¼ grain of morphine and gr. 1-100 hyoscine, one an hour before the operation; and after he was on the operating table the third branch of the trigeminus was injected at the foramen ovale and the cervical nerves along transverse processes,

also the edge and base of the tongue. The man was perfectly awake, but was a little drowsy. The incision was made, the external carotid ligated and the glands of the neck removed, as well as the left half of the lower jaw. The man had no feeling at all during the operation. The only thing he objected to was when something was held in his mouth. When the packing was taken out the next day, he gave a good loud yell, showing that if he had been hurt during the operation he would have made it known.

DISCUSSION.

DR. ABRAHAM said that he had had a case similar to that presented by Dr. Hurd—a tertiary case, operated upon last September. Wassermann test was postive, and the patient was treated for syphilis with salvarsan, receiving five or six injections; after getting two or three negative tests, it was decided to operate. A piece of the rib was placed in the nose for the saddleback deformity. Since October to the present time there has been a fistula, and by probing one could readily detect the free bone. An x-ray also showed the free bone. With a curette, the tract was entered, and a sequestrum similar to that shown by Dr. Hurd was removed. Another x-ray would be taken later.

DR. FAULKNER said that he had had some experience in the injection of the nerve for trifacial neuralgia, and had so treated a great many cases which he intended to report later. The difficulty is to get within the sheath of the nerve. In using alcohol, he puts in the needle and injects a drop or two of 1 per cent cocaine, and gets almost immediate anesthesia; but unless the anesthesia is almost immediate he does not consider that he is in the nerve sheath.

By working on the cadaver he can usually get in the sheath of the nerve but if he stops work on the cadaver he cannot do it.

He had learned some things very definitely—alcohol injection is no good unless you inject it within the sheath of the nerve. For this purpose he employs a special needle with a very abrupt bevel, and unless he succeeds in getting almost immediate anesthesia with the cocaine, he does not inject the alcohol, but tries it on another occasion. Sometimes one may not succeeed till he has tried several tissues. He has not had a single case of recurrence where he did get into the sheath of the nerve. Experience in these cases extends over a period of three years. One patient had had three alcohol injections, and said that the injection Dr. Faulkner made was different from the others he had had before. As they had not produced any numbness of his second and third divisions from the two injections he had absolute anesthesia in the region. They sometimes complain of the numbness for some time but usually seem to forget about it after a while.

Primary Epithelioma of the Frontal Sinus; Report of Two Cases. DR. D. S. DOUGHERTY.

(Published in the present issue of THE LARYNGOSCOPE.*)*

The Treatment of Frontal Sinus Suppuration. DR. HOWARD A. LOTHROP, of Boston (by invitation).

(Published in the present issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. ROSS H. SKILLERN (Philadelphia) said that as the Chairman had remarked, it was most unusual and most interesting to hear the observations of a general surgeon upon one of the specialties of the Section, speaking from the general surgical standpoint; but that it was very difficult for the specialist to discuss such an operation as presented by Dr. Lothrop, for the simple reason that they look upon it from an entirely different standpoint.

Dr. Lothrop would get these cases as a general surgean, *in extremis*, so far as the general pathological condition was concerned, whereas the specialist sees the case from the beginning—from the first catarrhal condition, the first headache, etc. Therefore to discuss the subjects against each other was difficult.

As he understood it, the object of the operation was to make as large a communication with the nose as possible,—in other words, Dr. Lothrop's remarks dealt almost entirely with the anterior superior nasal spine, the triangular portion of the bone up there; he takes away that process, thus enlarging the frontal sinus. It did not seem as though Dr. Lothrop was familiar with the work of one of our German confréres, Halle, who endonasally does the same operation by means of a simple rasp until he can make a sufficient opening, and then, by means of a burr, cuts from above downward and from in front backward—making the opening as much as possible through the nose.

So far as the value of the operation was concerned, Dr. Skillern said that it had been his experience that it was not necessary in all these frontal sinus cases to make as large an opening as possible. In the first place, the cases may be divided into two great groups: those that will get well by aeration and drainage, and those that will not. Those that will get well by aeration and drainage are those where there has not been much pathological change, so that a moderate amount of aeration and drainage will bring about a cure. On the other hand, where there are many pathological changes, it will not be cured by drainage, even if the opening is made as big as the thumb. As for curing a mucosa that has some pathological condition, unless the pathologically changed tissue is removed, the sinus will not recover.

Dr. Lothrop had said that our surgery must be more or less blind surgery, when we do this work through the nose. Dr. Skillern said that he would be very sorry indeed if laryngologists and rhinologists had to admit that the surgery they do up there is blind surgery. They could see pretty well what they are doing, and he felt compelled to take exception to that particular remark.

He could not exactly appreciate the object of opening up both sinuses, and he did not see at all why it was necessary to make such a large opening that it necessitated taking away so much of the septa of the nose. If drainage is going to prove sufficient, as much as was necessary could be done from one side. If it is not going to work, it made no difference how big the opening was. In his opinion it was advisable to conserve as much in that region as possible.

He also took exception to Dr. Lothrop's statement regarding the value of irrigation. There was no man present who had not seen

directly the value of irrigation. Many had had patients who had been treated by others ineffectually, and had cured them by two or three irrigations. Of course, however, where pathological changes are present, irrigation is not going to do any good—neither will drainage or aeration; the pathological changes must be removed to establish a cure.

The usual endeavor of frontal sinus operations is to obliterate the cavity, and this is done by most surgeons. Sramaylenko showed on dogs that when he removed the frontal sinus and closed up the cavity the sinus became totally obliterated by new tissue. Dr. Skillern said that in two or three instances he had had occasion to re-open the sinus, only to find that the cavity was obliterated; consequently he believed that all sinuses that are operated upon radically tend to grow smaller and obliterate themselves.

As far as the external operation is concerned, we are getting away from it more and more all the time, for intranasal work is curing most of our patients. We have drawn our lines pretty tight, and have now only three indications for external operation: (1) when we have done the intranasal operation and the patient continues to suffer; (2) when there are such conditions present as external fistulae formation, or (3) threatened cerebral and orbital complications.

As far as fistulae after the Killian operation was concerned, he had never seen one follow. He had done many Killian operations, and while he had seen diplopia and other bad conditions,—in one instance a death from meningitis—he had never had a fistula formation follow. He had, however, operated on a number of fistula cases following other operations on the sinus, with complete cure of the fistula. Dr. Lothrop had said that this part of the antero-superior nasal spine was the part to be removed. Dr. Skillern said that knowing that Dr. Lothrop would bring some specimens of this, he also had brought several, showing very small nasal spines and some with practically none at all; a rasp getting into any of these would open it up almost as well as an operation devised to take away the spine itself. In every one of these cases if the patient had frontal sinusitis, aeration and drainage could be secured by the intra-nasal method as well as the method shown by Dr. Lothrop. He goes in from above downward; why cannot we go in from below upward and do the same thing without injuring the external plate and without destroying the septum and other parts that might be injured? While this method is unquestionably effective, it would seem that at this time less extensive surgery would be indicated in most of the cases of chronic frontal sinusitis that come to the hands of the rhinologist.

Dr. Hurd said that he hardly felt qualified to discuss the paper for he had never seen the operation or its results. Dr. Lothrop performed a more extensive operation than the rhinologists do through the nose —a Halle operation. In discussing the matter one should take into consideration the number of cases that need an external operation. Probably not more than 5 per cent of the cases of frontal sinusitis need more than simple treatment—taking out the middle turbinate and anterior cells and enlarging the astium frontalis. A certain percentage, however, about five per cent, do not get well with an operation

like that. One ought to be able to differentiate the cases that need an external operation right there and then. Most of them are complications that arise from the ethmoid as well as the frontal sinus.

Dr. Hurd said that he disagreed with Dr. Lothrop about the size of the opening, and did not feel that the doctor's opening was large enough to investigate the frontal convolutions; the Killian operation gave a better one for that—it gives a view of the entire frontal wall of the sinus and the ethmoidal labyrinth where most of the complications arise, and if we do this Dr. Lothrop's (?) operation we miss the main point we are after. That there is a great deal of technique in the Killian operation, of course. Deformity? Yes. In a deep, high sinus there is considerable deformity; but if the technique is good, in a small or medium-sized sinus, the deformity is *nil*. The results are usually good. There is the one drawback, that there may remain a spot that does not become obliterated before it closes up—behind the bridge, the point that Dr. Lothrop was bringing out, where it bridges across with fibrous tissue. That will occur sometimes.

One point of advantage which Dr. Lothrop's operation possessed over the Killian operation was that the cell would sometimes appear in the crista galli or very near it. Dr. Hurd said that he himself had missed it several times and had had to go back after it.

DR. LATHROP: Go back after it and see it because you are going by a different route.

Dr. Lothrop takes down the septum and opens the other sinus; he takes down some of the nasal septum; and had reported cases without any bad results. Dr. Hurd said that he considered a septal abscess as a very serious condition; if a chondritis occurs the patient is liable to lose all the nasal cartilage and have a flat nose.

The point of irrigation: After the frontal sinus is opened, the case will get well, irrigation or no irrigation; drainage is established in the thickened tissue, irrigation will not do any good; bismuth paste will sometimes be effective, but not irrigations. (Demonstration on board.)

At times he had found that a cannula passed up through the tissue has caused a bloody tract, and near there there was pus under pressure.

DR. COFFIN said that he had been especially interested in hearing Dr. Lothrop's paper as he had felt indebted to him ever since receiving his reprint descriptive of the operation discussed by him to-night and had many times thought of expressing his appreciation to Dr. Lothrop but had procrastinated and was now glad for this opportunity. He then cited a case, that of a lady, upon whom he had operated seven times for involvement of the frontal sinus and recurrences. At each recurrence a fistula occurred which would not heal until radical measures were resorted to. Washes through and through from within outward and from without inward had no effect. There was in the case a specific element. The original operation had been after the Ogston method except that the wound was kept open and packed, which resulted, as it always does, in a considerable contraction, adventitious pockets and frequent recurrences. The night previous to the last operation, Dr. Lothrop's reprint came to hand and Dr. Coffin recognized in this operation what would probably bring permanent relief to his patient. The operation was done and now one can enter the operated sinus from either nostril and no further trouble is antici-

pated. In passing, Dr. Coffin stated that his patient had an aortic insufficiency and a blood-pressure of 230. Oil-ether anesthesia was administered rectally by Dr. Gwathmey with most gratifying results. Dr. Coffin expressed the opinion that Dr. Lothrop's operation was ideal in all cases in which sufficient drainage from the diseased frontal could not be established nor maintained unilaterally and further that it was a sufficient operation for the relief of an independently diseased frontal of small size and smooth interior; he could not see, however, that it could be sufficient, as Dr. Lothrop had described it with an incision one inch in length not crossing the supra-orbital notch, in those cases having practically multiple sinuses one one side which extended perhaps to quite the external angle of the eye.

Dr. Coffin called attention to Dr. Lothrop's criticisms of the Killian operation, that there followed a contraction on the side of the nose over the opening into the ethmoidal tract; this Dr. Coffin said he wished to contradict and this he did in the light of his own experience and in the presence of many men who for a number of years had been doing the Killian operation. As to cosmetic results following the Killian operation, Dr. Coffin agreed with Dr. Hurd that unless the frontal sinus was considerably broad and deep, there was but slight deformity and practically no scarring along the line of incision, at least not sufficiently marked to be detected at ordinary *tete-a-tete* distances. The frontal sinus is usually associatedly diseased, especially with the ethmoids and the operation to be done in any particular case depends entirely upon what one wishes to accomplish—whether simply the relief of pain—the stoppage of discharge or possibly the elimination of danger to the brain or eye. Of course, when the above condition prevails, that is associated disease, one doing the operation advised by Dr. Lothrop must needs follow it by an intranasal operation for the excentration of the ethmoid and sphenoid. This, to Dr. Coffin, seemed a foolish procedure, inasmuch as thorough excentration of ethmoids is better done through an external opening and with less danger to the patient. Dr. Coffin considered the Killian operation the operation of choice in all cases of pan sinusitis. The operation for pan sinusitis is frequently spoken of as a frontal sinus operation. The operator having in mind at the same time the fact that he means the operation on several sinuses.

Dr. Coffin asked Dr. Lothrop what he would do in those cases having but one frontal sinus.

Dr. Myles said that Dr. Lothrop's operation supplied something that had long been wanted. Many years ago he himself had tried by an external operation to remove that part of the nasal process of the superior maxillary bone which forms the floor of the frontal sinus, and obtained some fair results, but it did not appeal to him as being a perfected operation and he dropped it. What Dr. Lothrop had said about the removal of the bones beneath the orbital ridge in the Killian operation was true. The periorbital tissues contracted toward the nasal septum and cribriform plate and prevented drainage from any unobliterated area. It would seem, if no extensive inflammation on the septum or in the crista gallin or cribriform plate regions followed, that Dr. Lothrop had offered a valuable operation for the removal of obstruction and the drainage of the two sinuses. In apparently hopeless antral cases we may remove the wall and secure

proper drainage without curettage, and often a very remarkable change will take place. We should expect the same in frontal sinus cases.

One of the aims of Dr. Lothrop's operation was to remedy diseased conditions where other operations had failed, such as the Killian and intra-nasal operation, and the doctor had shown a remarkable record of recoveries.

DR. YANKAUER said that he had had no experience with this particular operation, and could only report his experience with Halle's operation. He had made a set of burrs corresponding to those described by Halle, and had done the operation described by him three times—twice on one patient and once on another. Unfortunately, all these cases had been operated upon intranasally, and it was impossible to make Halle's flap in the outer nasal wall so that the opening finally contracted and left the drainage very inadequate. With the Halle burrs, as with other instruments, he had found it practically impossible in the large majority of cases to make a straight opening into the frontal sinus without coming out in the angle of the eye. If this operation proved to be as feasible as it appeared to be in the specimens which Dr. Lothrop had presented, it would be a great gain in many instances.

He doubted, however, whether Dr. Lothrop was correct in stating that it was harmless to open the opposite frontal sinus. Dr. Yankauer said that he had seen many sinuses that were wide open, where the drainage was full and adequate, in which infection continued. Many of the organisms which infect the sinuses burrow down deep under the mucous membrane, and once they get under the surface it is very difficult to get rid of them, and they will do that often, whether or not there is drainage.

However, one should be guided by practical experience rather than by theoretical considerations, and Dr. Lothrop's record of thirty cases was a very remarkable one and should induce others to follow his advice and try this operation.

The mechanical difficulties of performing the operation were greater, however, than would be realized at first. As Dr. Myles had said, the bone in that neighborhood was very hard; in old, chronic cases there might be some softening, but usually it was like a piece of ivory, and it would take a long time to file through it with rasps. He would like to know how long it took Dr. Lothrop to get through. In using the Halle burr himself, with a very rapid motor, he had found that it required a little time to get through this very dense, hard bone; it was difficult to do it, although the burrs worked very well on dry bone outside.

DR. LOTHROP (closing the discussion) said he would endeavor to cover the points in the order in which they were suggested. In the first place, the majority of cases that he had operated upon had undergone previous operations, although in a number of instances his operation had been the first external one performed. He believed his operation was indicated in every instance where any external operation was necessary. He did not consider his operation a destructive, but a conservative one and, at the same time, more radical than any of the other types of operation. There is really less destruction of bone than in the Killian operation and a minimum of soft part injury, particularly when compared with the Killian. He recalled two cases, one of which was operated by his method and the other by the Killian technic. In the first instance, there

was practically no soft part swelling and the patient left the hospital in a few days. The second case was confined for several weeks because of sepsis in the soft parts about the wound. After the sinus has been opened, whatever is found wrong with the mucous membrane must, naturally, be treated just as you would treat polyps, granulation tissue, necrosed bone, etc., in any region. This is done, of course, at the time of the original operation. It is perfectly obvious that when one depends upon the internal route the cavity of the sinus cannot be explored or properly treated in the presence of the above complications.

When he spoke of a "blind operation," he did not wish to be misunderstood as saying that this special Section or that any of the special surgeons were doing blind work, but that any operation performed on a part where you cannot see just what your instrument is doing, is working in the dark to a certain extent, no matter who the operator may be and in that sense the technic cannot be so well carried out.

The cases of failure after any operation, whether intra- or extra-nasal, that he had seen had been relieved when the drainage was made efficient by whatever method. He felt that the underlying cause of failure in any operation was due either to the fact that there was so much obstruction in the vicinity of the ostium frontale that the exudate could not escape or because there were pathological conditions within the sinus which required treatment. All cases of persisting external fistula are due to obstruction between their opening and the nasal cavity and this is usually in the vicinity of the ostium frontale. If you leave a sinus full of polyps the symptoms will continue until the polyps are removed. If you fail to remove all of them at the first operation the chances are that those remaining will increase in size and others appear just as within the nasal cavity. In such cases the mucosa should be carefully and thoroughly curetted. In his series of cases the only one that required a second operation was just such a case. At the second operation the sinus was found filled with polyps and after this second procedure, which included careful curetting, there was no subsequent trouble.

Dr. Skillern was right when he said that in time frontal sinuses tend to become obliterated. He himself had observed this frequently but, if the sinus is large, obliteration does not entirely take place. In all cases it is only the angles and narrow borders which become filled up with permanent scar tissue, depending in a measure upon the distance between the various walls of the sinus. The larger portion toward the inner aspect of the sinus persists. Dr. Skillern said that he could see what he was doing in the intra-nasal operation by intra-nasal inspection. Dr. Lothrop said that such was not his experience. He said that he never could observe from within the region where he removed the dense bony ring anterior to the ostium frontale—that this region was accessible only to curved drills and rasps as carried out in his operation. Dr. Skillern had spoken of the removal of the portion of bone in the middle line and indicated that it was generally thin, showing specimens, and intimated that Dr. Lothrop had selected specimens which happened to contain more dense bone. Dr. Lothrop said that he referred to the thick bony mass forming the upper ends of the nasal bones and nasal process of the superior maxilla and, in every instance, these possess considerable thickness

and their location is not only in the middle line but they extend well around in front and laterally. He indicated that this was the chief feature in his operation.

In two instances he had seen small abscesses in the septum which cleared up very rapidly after a small incision was made. In his operation the portion of the septum of the nose removed had to do with the middle plate of the ethmoid and did not go so low as the triangular cartilage. Hence, Dr. Skillern is probably wrong in attributing the abscess to lowered vitality of injured cartilage. On the other hand, no one hesitates for a moment to do a submucous resection which always involves cartilage injury. He believed it was reasonably easy to exenterate the necessary amount of turbinate body according to the cells involved and at the same time carry out this procedure with reasonable safety. He usually employs the method suggested by Dr. Mosher and had done this in a number of cases in his series where the ethmoidal cells were involved as well as the frontal sinus. He had also at the same time in other instances removed the nasal wall between the antrum and the nasal fossa below the inferior turbinate in cases where the antrum acted as a reservoir.

Dr. Coffin had spoken of multiple sinuses. That was new to him. He had always understood that there were never more than two sinuses and that sometimes only one is in evidence as a true sinus, the opposite side being represented by small ethmoid cells. On the other hand, one often finds incomplete septa more or less subdividing either sinus but never producing isolation. Such experience was based on the observation of about 1,000 specimens at the Harvard Medical School.

Dr. Lothrop believed one great advantage of removing the floor of the two sinuses, in addition to obtaining the extra room, was the fact that on the well side there was healthy mucous membrane ready to epidermize the diseased side. In no case of his series was there any complication resulting from making use of the healthy side.

Dr. Lothrop said he was not familiar with the Halle operation, which he understands is an intra-nasal effort to make a large opening on one side including the turning up of flaps to epidermize the area injured. He was rather skeptical as to the possibility of carrying out such technic by turning flaps successfully. On the other hand, these flaps being of soft parts would tend to obstruct the opening and thereby make narrower just the region where one was striving to obtain all the room possible. In performing the Halle operation, if bone was removed near the median line, he thought quite often the other sinus would be opened, sometimes unbeknown to the operator.

Bacteria are much more virulent and produce more injury when under tension; consequently, if there is free drainage, resolution follows rapidly. He had known of one or two exploratory operations performed by others where infection followed because of the retention of blood clot in the sinus.

Dr. Coffin asked whether or not Dr. Lothrop would find himself handicapped in one of these cases where there was only one sinus. Dr. Lothrop replied in the negative, saying that previous examination by x-ray and otherwise would furnish sufficient advance evidence as to the number, size and situation of the sinuses.